

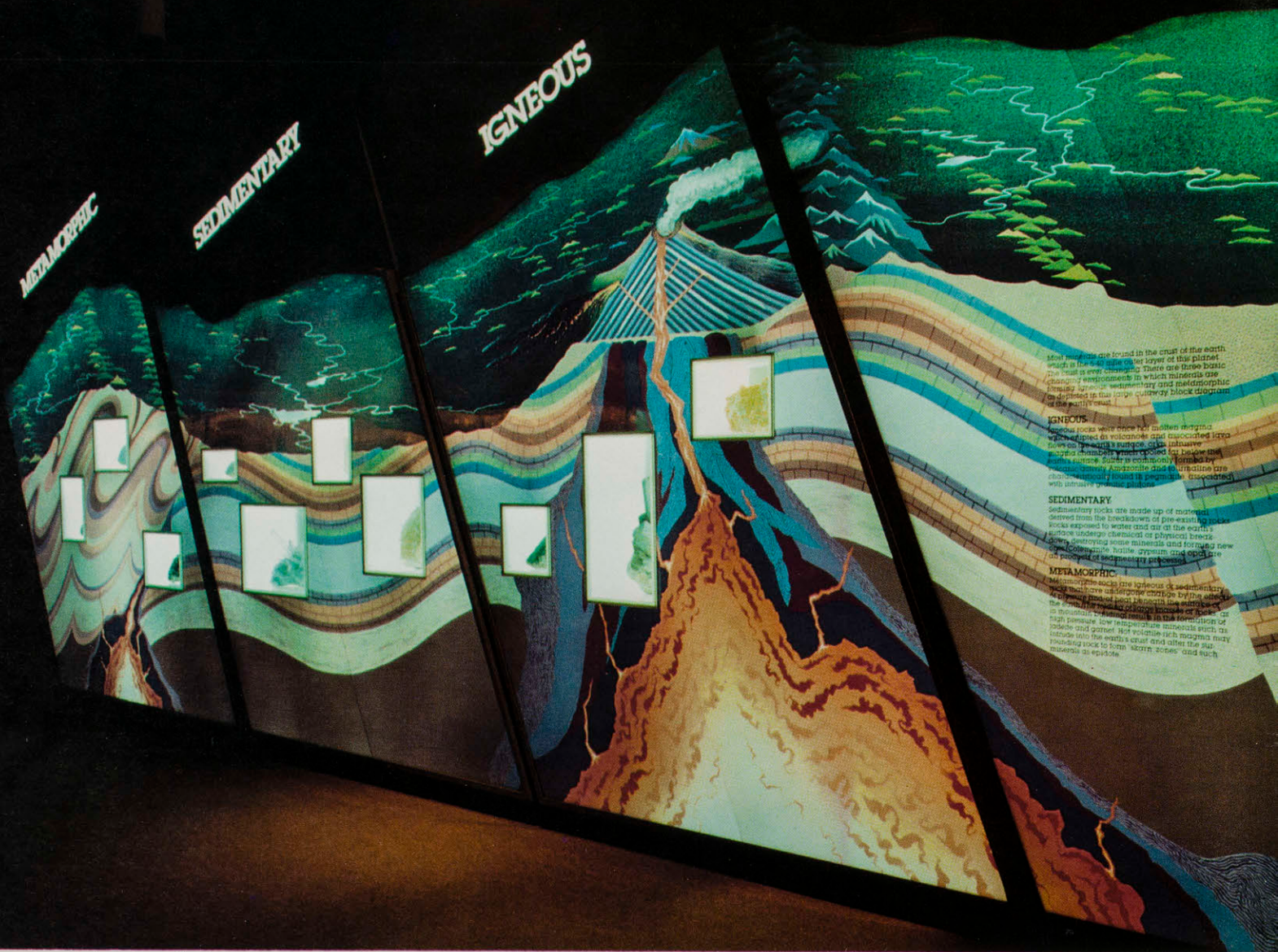
THE MEMBERS MAGAZINE OF THE NATURAL
HISTORY MUSEUM OF LOS ANGELES COUNTY

Terra

VOL.16/No.4 SPRING 1978



Introducing the E. Hadley Stuart Jr. Hall of Gems and Minerals



A giant hypothetical cross section of the earth's crust, drawn by Joseph Nakanishi, is used to describe the three geological environments from which minerals form: igneous, sedimentary, and metamorphic. Actual specimens are set into this cross section and spotlighted as they are discussed in an audio session.

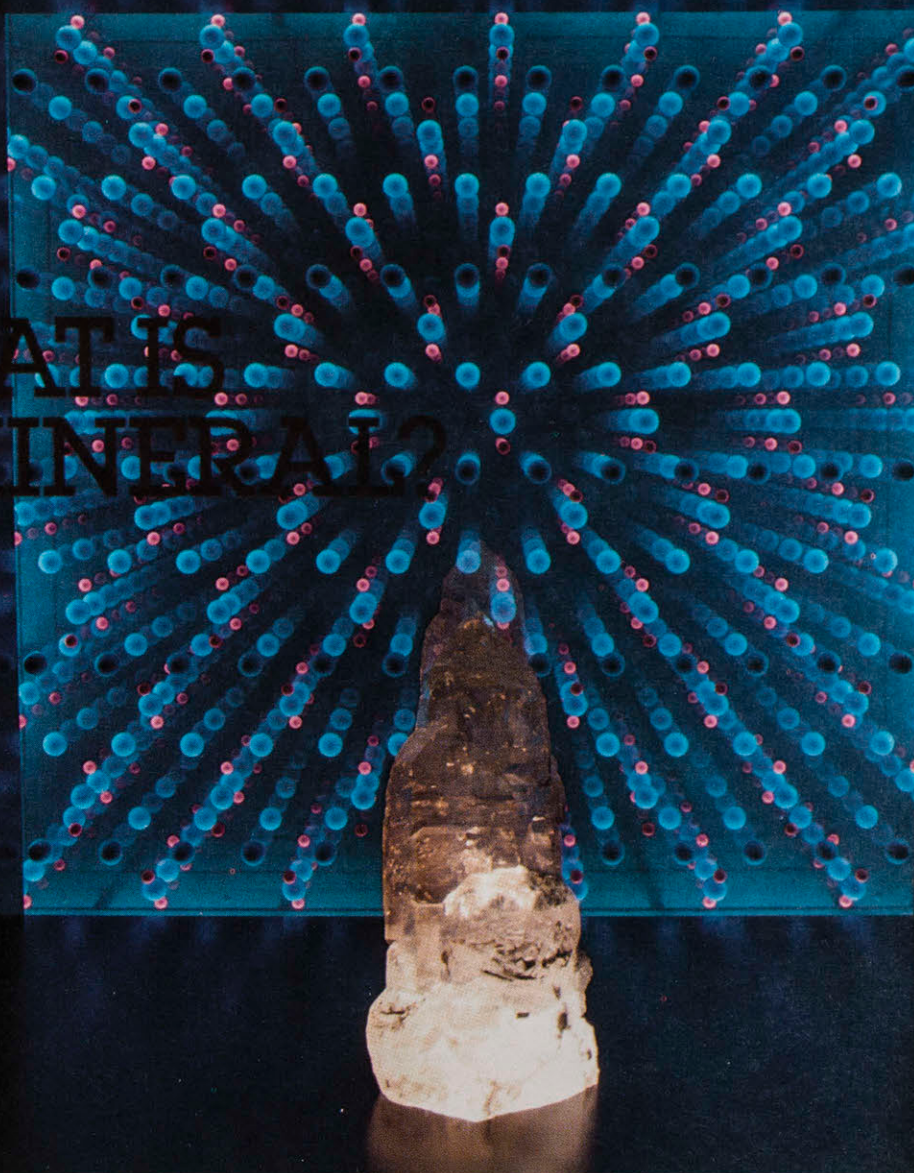
geologic environments in which minerals are formed. To explain these environments, representative mineral specimens are set into the artwork, and each specimen is individually spotlighted as an audio tape describes it. Outstanding examples in the environment exhibit include a large tourmaline from Brazil, set in the igneous environment of the batholith; a beautiful selenite from the limestone of Mexico, representing the sedimentary environment; and a cobble of jadeite from Burma for the metamorphic environment.

The remainder of the north wall, moving counterclockwise, is devoted to explaining the basics of mineralogy, using entirely new techniques. The first exhibit examines the controversial question,

"What is a Mineral?." There is general agreement on the characteristics that a mineral must possess: that is, it must occur naturally, form from inorganic processes, have a definite chemical composition, and a definite crystalline structure. However, considerable debate arises when one considers the important exceptions to these basic general characteristics. For example, one of the most abundant rock types in the earth's crust, limestone, is composed primarily of calcite (calcium carbonate) derived from the skeletons of dead organisms. Certainly this substance must be considered a mineral, but it is organically derived. The beautiful yellow sulphur crystals found in the cap rock of salt domes along the Texas and Louisiana gulf coasts are a

product of the digestive systems of certain types of anaerobic bacteria. But no one questions the validity of native sulphur as a mineral species. The restriction that a mineral must be crystalline and solid is defied by two amorphous substances, opal and mercury. Neither has internal order, and mercury is not even solid until it reaches -40° centigrade. And what about a substance such as rust, ferrous oxide, found on anything made of iron, from nails to automobiles—can it be a mineral? It is formed naturally, but on iron made by the organism, man. So the controversy over a strict definition of a mineral persists. The "What is a Mineral?" exhibit uses colored spheres to reproduce the atomic structure of quartz crystals, showing the orderly arrangement of

WHAT IS A MINERAL?



A spectacular quartz crystal from Minas Gerais, Brazil, is set in front of a unique presentation of its atomic structure. The exhibit discusses the complexities of "what is a mineral."

atoms characteristic of a mineral. Set in the foreground of this exhibit is a huge internally-lit quartz crystal, loaned by Ed N. Harrison. This crystal shows the external form of the atomic structure represented in the background.

The next exhibit employs fiber optics to show how a crystal grows by adding atoms on certain planes defined by the crystal's atomic arrangement. But crystals need room to grow; accordingly, the next display, one of the most prominent in the Hall, portrays a hypothetical, greatly stylized hydrothermal vein system extending up to the ceiling. Set into this artwork is a four-foot-long amethyst-lined lava tube from Brazil which is internally lit to show best its beauty.

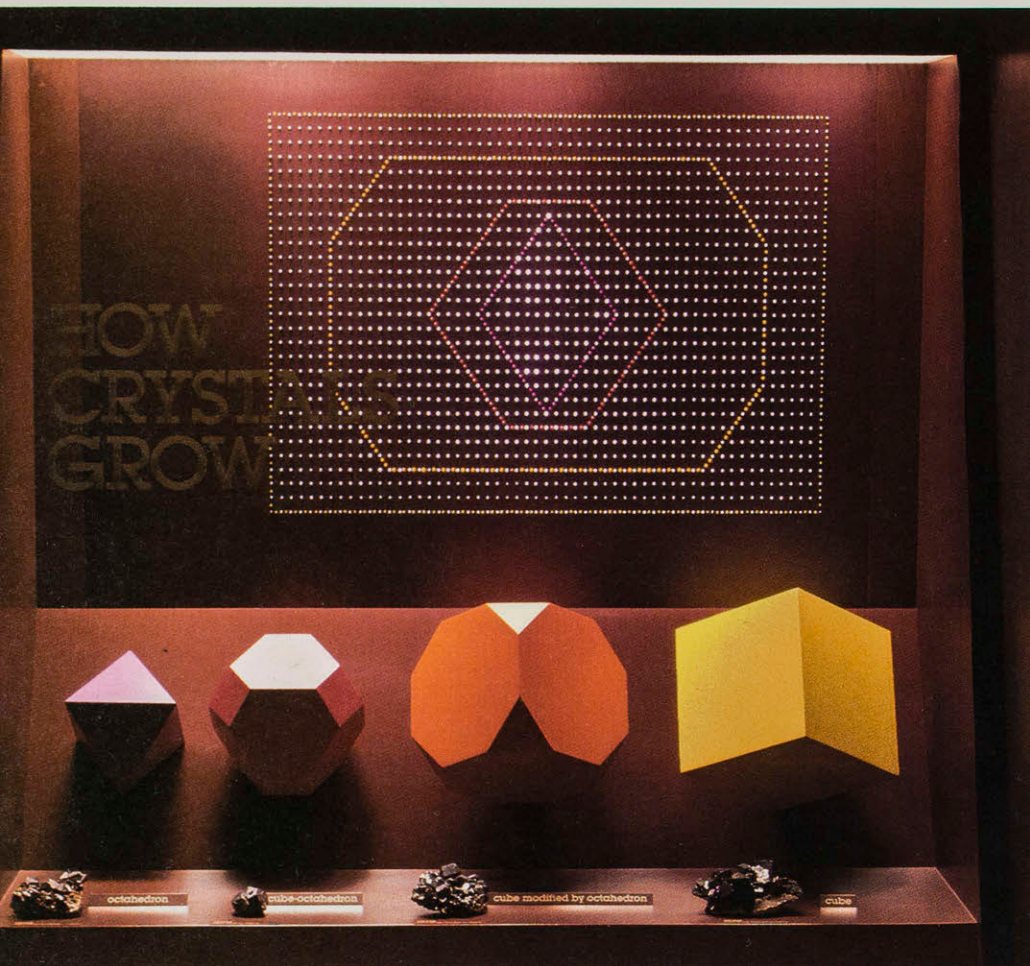
Crystallography is one of the most

complicated concepts for the beginning mineralogist. Quite simply, there are six basic crystal systems within which all of the more than 2,500 mineral species can be assigned, depending on the relative lengths and angles of their three crystal axes. The basics of the complex subject of crystallography are presented using neon sculpture and backlit crystal drawings of each of the six basic crystal systems. These graphics, supplemented by excellent specimens from the Museum's collection, introduce the visitor to crystallography in an absorbing fashion.

Following the formation of a crystal, the local condition in which it grew may change, causing the crystal to be replaced by another mineral species that is more stable in this new environment. Quite

commonly, however, the original crystal form is preserved. These replaced crystals are known as *pseudomorphs* (from the Greek words for false [pseudo] and form [morph]). In the "Minerals Do Change" exhibit, four examples of unaltered minerals, together with corresponding pseudomorphs are displayed. In addition, several outstanding examples of pseudomorphs are included at the base of the exhibit.

The physical properties of a mineral are extremely useful for its identification. The next series of exhibits illustrates each of these physical properties; hardness, transparency, streak, color, specific gravity, luster and cleavage. Especially intriguing is the case showing double refraction (how some minerals have the



Fiber optics is utilized to portray graphically how a crystal grows, and how, by preferential growth along certain phases, the crystal can be transformed from an octahedron to a cube.

A mineral's physical properties are useful in its identification. A series of small exhibits show these properties and how they best can be utilized in mineral identification.



ability to split light into two distinct rays), in which a laser beam is split after passing through a piece of optical calcite.

When certain minerals are exposed to ultraviolet light, their atoms are excited and they show fluorescence, exhibiting a brilliant array of glowing colors. This fluorescence is usually the result of trace amounts of impurities that were incorporated into the mineral during its formation. Trace amounts of manganese, for example, will commonly cause calcite, which is stark white in ordinary daylight, to glow bright red under ultraviolet light. Previous exhibits have demonstrated fluorescence using ordinary, unattractive specimens. The curators decided to utilize this exhibit space to its fullest capacity by displaying specimens that are impressive in both ordinary light and ultraviolet light; a timer periodically switches from one light source to the other to illustrate contrast. Two viewing alcoves have been designed for this purpose. A third alcove in this area houses specimens that are photosensitive and turn black or decompose when exposed to white light. A red filter installed in this case allows us to exhibit important specimens such as the world's largest proustite, a beautiful red "ruby silver."

A common question among museum visitors is "what is the difference between a gem and a mineral?" The answer is simple. Gems are minerals which possess three important characteristics that have, through the ages, made them sought after for personal adornment. These characteristics are durability, beauty, and rarity. The "Minerals to Gems in the Americas" exhibit focuses on the history of the gemstone prior to its appointment with the gem cutter. An audiovisual display at the west end of the Hall shows how the important gem species of the Americas have formed, how they occur, how they are mined, and how they are processed after being extracted from the earth. A supplementary series of six display cases contains fine gem specimens, both rough and cut; the beryl group (which includes aquamarine and emerald), topaz, spodumene, turquoise, and opal.

The Minerals to Gems area provides a perfect introduction to the most elegant portion of the Hall, the Hixon Gem Vault. This is undoubtedly one of the most unusual gem displays anywhere. The vault itself is impressive, with its black granite exterior and four-ton stainless steel door. The visitor is encouraged to enter the triangular-shaped room containing a

world of dazzling riches. The two walls in front are polished black granite, identical to the vault's exterior walls, contributing to the sense of heavy security. The floor, the ceiling, and the back wall offer a dramatic contrast in that they are covered with thick, burgundy-colored velvet carpet. The light in the vault is subdued except for the spotlights on each of the fourteen granite-base cases. Each spotlighted case holds a fabulous array of colored gem stones—sapphires, tourmalines, emeralds, rubies, aquamarines, diamonds, and dozens of more exotic gem species. Nowhere else in the United States are gems exhibited publicly in such an innovative fashion.

Two large pieces of jade, one from California and the other from Burma, flank either side of the entrance to the gem vault. These rest on granite pedestals, and visitors may touch them. We have several other touch specimens throughout the Hall, for we believe it is an important part of a museum experience not only to view rare specimens but to be able actually to feel some of them. These "touch" specimens include a 100-pound fragment of the Canyon Diablo meteorite from Arizona, a true visitor from outer space.

The entire south wall of the Hall is devoted to the classification of minerals by their chemical composition. Today, there are over 2,500 valid mineral species already described, and this number is growing at a rate of about twenty-five per year. It is, therefore, necessary to use a convenient method of grouping minerals so that species with similar characteristics can be examined together. For several hundred years, mineralogists attempted to develop such a system, but with little success. A Swedish chemist named J. J. Berzelius (1779–1848) published a system of mineralogy based on chemical similarities in 1814, but it was not widely adopted. Not until 1850, when an American named James D. Dana (1813–1895) published a similar system, also based on the chemical similarities of minerals, did this method of grouping mineral species gain general acceptance. This system groups mineral species into classes based on their anionic group; that is, by the negatively charged atom represented on the right-hand side of the mineral's chemical formula (for example, CaF_2 —calcium fluoride, is a fluoride). Thus, we have native elements, sulphides, oxides, chlorides, fluorides, carbonates, sulphates, phosphates, arsenates, molybdates, silicates, and so on. On



Subdued lighting and polished black granite walls help enhance the beauty and elegance of the Hixon Gem Vault. This exhibit, literally a walk-in vault, contains the Museum's finest cut gems.

the left-hand side of the chemical formula are the positively charged cations. The most common of these are aluminum, sodium, calcium, iron, magnesium, potassium, and silicon. This last is the most abundant and readily combines with the most common anion oxygen to form the most abundant class, the silicates. Silicates make up 25% of the earth's crust.

This sixty-foot-long exhibit devoted to the classification of minerals forms the teaching basis of the Hall. To maintain high quality, this exhibit displays only exceptional specimens representative of each group rather than attempting to include examples of all known mineral species, as is so commonly attempted in mineral exhibits.

The entire central portion of the Stuart Hall is occupied by a collection of exceptionally fine mineral specimens. These specimens, classics in their own right, are highlights of the entire mineral exhibit. These classics are displayed in unusual parallelogram-shaped cases approxi-

mately six-and-a-half feet high, each with a granite base. The specimens, primarily selected from the E. Hadley Stuart, Jr., Mark and Jean Bandy, and main Museum collections, include both rare and beautiful specimens. It is hoped that they will be enjoyed simply because they are so magnificent.

After wandering through the maze of parallelogram cases, the visitor concludes his visit to the Stuart Hall with an exhibit entitled "Gold Rush." Dedicated to George Hearst, a leader of North American gold mining, this exhibit focuses on that important, intriguing, and elusive species—gold. Gold has played a monumental role in California history, and especially in its American period early economic growth. Accordingly, this display includes numerous examples of early mining tools and other artifacts of the gold rush era. The highlight of the exhibit is, however, gold—gold in all its many beautiful natural forms. Upon entering the exhibit the visitor is over-



whelmed, totally surrounded by gold nuggets, gold crystals, gold leaves, gold wire—all just as they were found in nature and extracted by gold miners through the years.

The Stuart Hall is one of the most important exhibits of its kind in the world. The opening of the Hall marks the culmination of many years of effort, but at

the same time, it also marks the beginning of a new phase in the development of gem and mineral collections. The Museum will continue acquisition of exceptional specimens to assure that displays are constantly improved and expanded so that each visit to the Hall will offer the regular visitor a new and exciting experience.

The "work horse" of the hall is the 60-foot-long systematic mineralogical wall explaining the classification of minerals by their chemistry.

Peter C. Keller is curator of Mineralogy/Geology at the Natural History Museum of Los Angeles County. His special interest is Mexican mineral deposits.



A view of the hall looking west, with one of the "touch specimens," an Illinois fluorite in the foreground, and the elegant parallelogram cases behind.

Mark Chance Bandy and His Collection

by Jean Bandy

Photos by Larry Reynolds



Representative of the fine suite of English minerals in the Bandy Collection is this beautiful 8 cm. high calcite "butterfly twin" from Egremont, Cumberland, England.

Bandy prospecting in Bolivia.



It is hard to separate the life and work of a mineral collector from the beautiful specimens which he has gathered. My husband's work was mining, but his avocation was mineralogy, collecting and studying minerals.

The love of minerals seems to grow on one, even if one is not a mineralogist. When I married Mark Chance Bandy and went with him to Chile, the minerals went with him. I came to love them and now wish that I had learned even more about them. Some of the beautiful minerals in the Bandy Collection that I have given to the Natural History Museum of Los Angeles County were originally presents to me for anniversaries or birthdays; they soon found their way back into the collection.

Mark Bandy was born July 22, 1900, in Redfield, Iowa, the only child of John L. and Hattie E. Bandy. He attended the Redfield schools and Drake University. After graduating from Drake, he received a Lydia C. Roberts fellowship to Columbia University, where he received both Master of Arts and Engineer of Mines degrees. In 1926, he went to Tampico, Mexico, for Huarteca Petroleum, but because of a back injury received earlier, was returned to the United States for recovery. Later he went to El Pao, Venezuela, where he built a camp and was in charge of the El Pao iron deposit.

A year passed and he became so ill with malaria that doctors recommended that he go to a high dry climate. He came back

to Iowa, we were married, and he took this Iowa farm girl to Chuquicamata, Chile, in the Atacama desert, where we stayed five years. While we were there Mark found new minerals which were described later. In addition, on trips of his own, he saw mines and deposits which he had read about. The pleasure derived from these more than overcame the inconveniences and frustrations experienced in traveling and the accommodations he had to put up with.

One of the new minerals he brought back from Chuquicamata, Chile, was lindgrenite, described, I believe, by the late Dr. Charles Palache, head of the Department of Mineralogy at Harvard.

Perhaps the most unwieldy of all specimens we brought from Chile was the gypsum twin given Mark when we visited Braden Mine in Sewell. In the engineering office the draftsmen were starting balky pens on these beautiful crystals, which served as bases for their stools. I don't know why they didn't use the seat of their pants for the purpose, as some draftsmen do. Mark was pleased to have the gypsum twin, and gave me the job of somehow carting it home. It's just longer than the seats of Chilean trains are wide, so it was a problem I had to cope with all the way. Everyone bumped it, going back and forth. When you see the collection you will appreciate my difficulty in transportation.

The sulphur crystals from Aconquilcha are beautiful; they come from an altitude

of 19,500 feet and represent a lot of arduous climbing. The wife of the mine owner advised Mark to drink tea made from coca leaves, as the cocaine would help him climbing. It was most helpful, he said. Aconquilcha was an active volcano, so the miners devised a sort of hood to put over a portion of the opening of the volcano, and crystals formed on it.

Easter Island was near the top of a list of places Mark wanted to visit in his lifetime. He planned his next vacation for the time when the boat was going there. The trip was enjoyable, and valuable, too, for he wrote "Geology and Petrology of Easter Island," which was published in the *Bulletin of the Geological Society of America*.

Mark's curiosity about the roof of the world, "far away places with strange sounding names," is explained in "Te Pito-Te Henua," a series of letters he wrote from Easter Island to his family, which he later privately printed for them as a small book. Here I quote from it:

"There are one hundred and sixteen images scattered about this interior slope (of the Volcano Rano Raraku), some of them standing, some thrown like ninepins in a wide zone extending from quarries at the lip of the bowl to the rushes that border the water. Inside the crater, despite the leering images, is peace. The slopes are covered with green grass and descend gently to a lake no more romantic than an Iowa mill-pond."

"While reading a book by Casey, I came across the above quotation. Having known a number of Iowa mill-ponds I had never seen one that held much allure except as a swimming hole. Never in my experience were they rimmed with almost two hundred monolithic stone images. I suspected Casey of not knowing his Iowa mill-ponds.

"At another place in the book the statement was made that the company of Williamson, Balfour and Cie. sent a boat to Easter Island each year. Easter Island, like Tristan da Cunha, Herguelin Island, Spitzbergen, etc., was near the top of a long list of places I hoped to visit before I died. I immediately started corresponding with Williamson, Balfour and Cie., a correspondence marked by keen enthusiasm on my part, and a marked coolness on the part of W. B. & Cie. After enlisting the aid of every available person, permission was finally granted to go to the island on their annual boat."

After our five years in Chile we came back to the United States so that Mark could go to Harvard for his doctorate in



Among the specimens which Bandy collected in Llallagua, Bolivia, is this remarkable 31 x 23 cm. plate of arsenopyrite (above) and this fine specimen of quartz on cassiterite (opposite), measuring 10 cm. across.

mineralogy. We were in the midst of the depression so I had to go to Iowa to live with my mother, visiting Mark in Cambridge from time to time.

After Mark's graduation we went to Bolivia, where, from 1936 to 1947, he worked for the Patiño Company. Bolivia is truly a mineralogist's paradise. However, that mineralogist has to be of sturdy stuff, for some of the better minerals seem to prefer higher altitudes. The arcatin crystals are acquired after going over a pass, 16,500 feet. One fourth of July, Mark was to go there for some work and the pass, just off the equator, was covered with snow drifts car-high. Our arrival was postponed till the road could be opened. The lovely apatites are relatively easy to come by. Mark brought many in and cleaned them as he sunbathed in the patio. Each had its own particular beauty and was kept for that reason.

As I was going through the boxes sorting things for the Museum, I found them labeled "Excellent," "Good," and "For

Trade." It reminded me of a funny story about the apatites. The acting mine superintendent of Patiño was interested in minerals only mildly. He saw the pocket of "Mark's" apatite crystals and didn't recognize them; he told the miners to blast there so that he could get a sample to have it analyzed. Mark went by after the blast and saw what had happened to "his" crystals. He asked the miners what had happened and they told him. As he left the mine that noon, he stopped by Acting Superintendent Hampton's house and told Mrs. Hampton that we wouldn't be able to go to the party she and her husband were having that night. We actually didn't go, Mark was that upset. We remained friends, but relations were strained for awhile.

In *Special Paper No. 1* of the Tucson Gem and Mineral Society, titled "Mineralogy of Llallagua, Bolivia," Mark listed all the minerals found in Llallagua during the years we were there.

After Bolivia Mark and I spent two

years travelling over Europe, Africa, and Turkey while he examined mines and was at The Hague as industrial specialist for E.C.A. for several months. Then, when the Patiño Company started a new venture in South Africa and Southern Rhodesia, Mark went with them and we lived in Rhodesia for two-and-a-half years. It was there that Mark brought the famous Molly Copper Mine into production.

Our life read like a travelogue. When Patiño liquidated his interests in Africa, Mark and I went to St. Andrews, Scotland, where Mark lectured at the venerable university for a year. He so enjoyed teaching and we both enjoyed St. Andrews.

We came home from Scotland to Moab, Utah, where Mark worked as a consultant for Mi Vida Mine. After we established our home in Wickenburg, Arizona, Mark acted as a consultant for different mining concerns. It was about this time the doctors discovered his cancer. This did not stop Mark. After an operation, he was off to Africa, prospecting for diamonds in



Ghana. Ill again, he returned to Wickenburg to unpack the treasures he had stored away for many years. He built a small home museum, which everyone called his "ore house." Getting it ready, unpacking the minerals, and displaying them proved better therapy than anything else until his death, June 3, 1963, at the age of sixty-two.

Collecting old books on mineralogy goes hand in hand with mineral collecting. We visited musty old book shops in Antofagasta, Paris, Johannesburg, Buenos Aires—wherever we went to see what might be there. And we collected catalogs, just a different kind of "Wish Book" which often carried descriptions of books such as Agricola's *De Natura Fossilium*, Pryce's *Treatise on Minerals, Mines, and Mining*, and *British Mineralogy* (in Five Volumes) by Sowerby.

One of Mark's great triumphs was the translation from the Latin into English of *De Natura Fossilium*, for which he generously gave me co-credit because I helped

with the grammar. The project took approximately twenty years to complete, for most of the time we were in places without libraries. Our greatest help was a Harkness Latin grammar. The translation was published as *Special Paper 63* of the Geological Society of America.

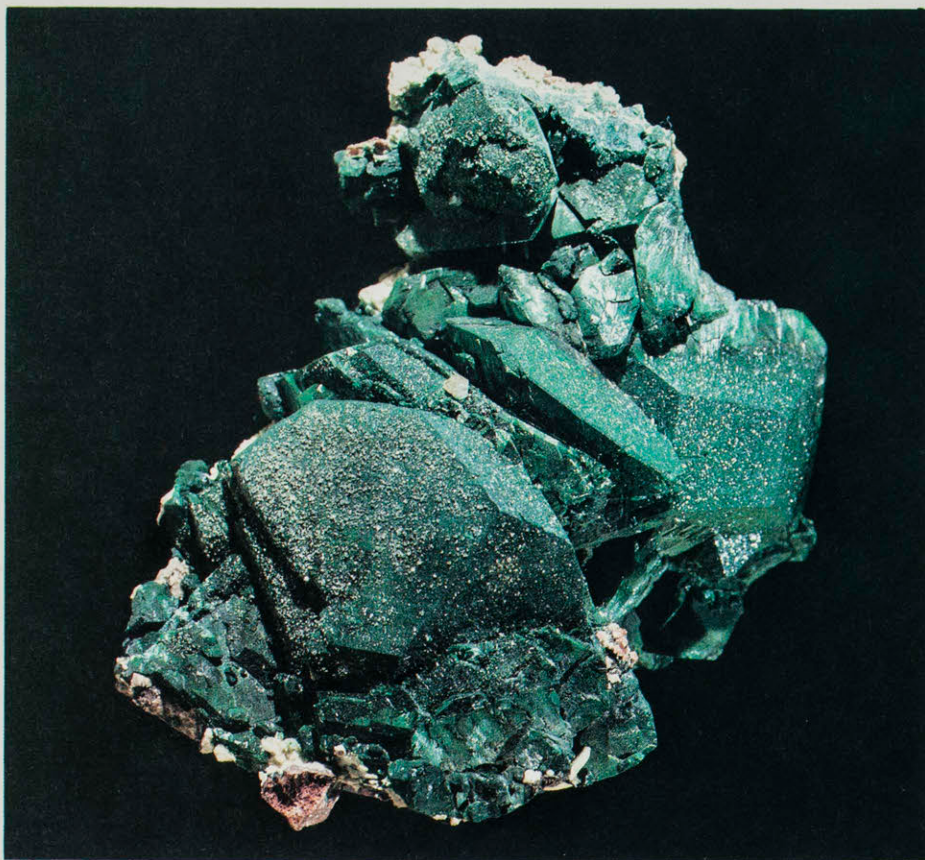
Mark's attitude about collecting might be summed up in some quotes from his "Treatise on Mineral Collecting" in *Drake University Magazine*, December, 1961:

"The first Mineral Collector was probably a primitive man intrigued by a piece of shining quartz, a brightly colored piece of chalcedony or a mass of metallic gold or copper. He may have had his attention caught by the weight of a piece of sparkling hematite or magnetite as he searched for a stone to kill a bird or small animal. From this humble beginning, the hobby has grown through the ages.

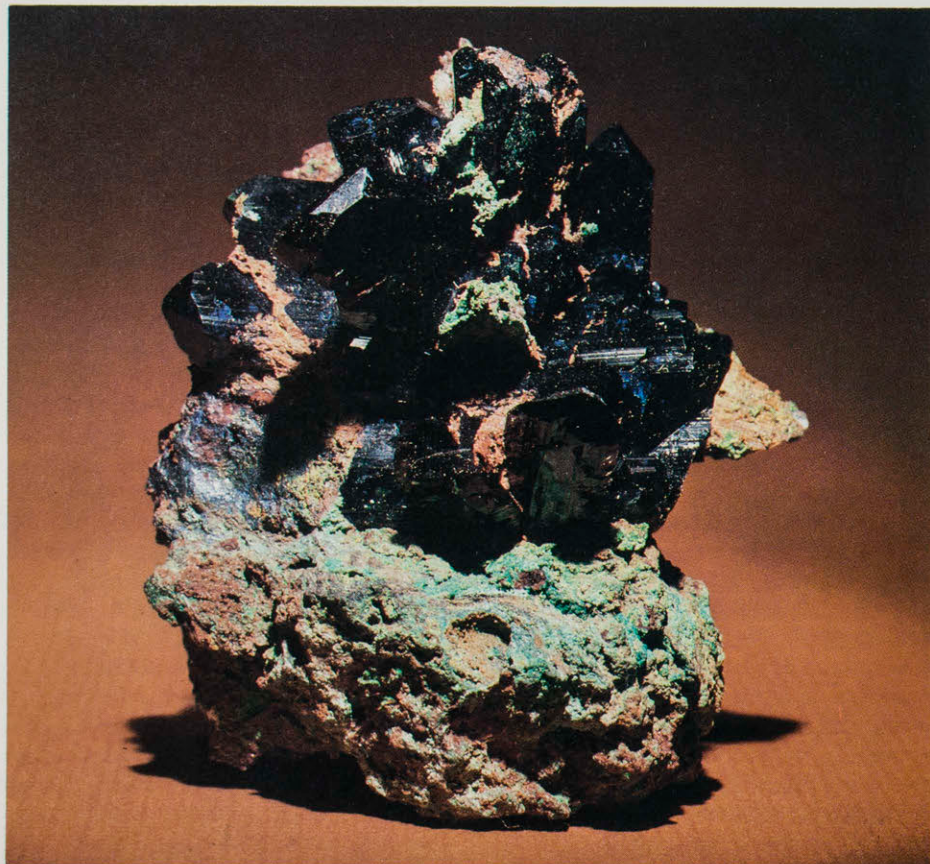
"Interest in minerals and collecting has come in waves in the past several centuries. With the revival of mining in

Europe in the fifteenth century, the exploration of rich silver, lead, gold and copper veins in various European centers brought a wide variety of minerals to the attention of miners and others. Advances in chemistry in the mid-eighteenth century brought the next impetus to mineral collecting, and as the science of crystallography advanced rapidly at the end of the century, these two sciences gave rise to a great upsurge of collecting in Europe during the first fifty years of the nineteenth century. The 1930's saw the beginning of the present expanding interest in this hobby in the United States; today there are probably 5,000 amateur mineral societies in the nation and the number is growing. There is a similar although less spectacular revival of interest throughout the world. The hobby offers almost everything; healthful outdoor exercise, plus as much knowledge of geography, geology, chemistry and mathematics as the hobbyist cares to seek out.

"There is an increasing sense of pride as



Mark Bandy obtained the Kegel Collection for the Smithsonian Institution. This exceptional collection of minerals from Tsumeb, South West Africa, included this fine 15 cm. high malachite after azurite (above) and this 10 cm. high azurite (below), which he added to his own collection.



a collection grows, a growing appreciation of the beauty offered by minerals and a sense of wonder at the forces that created such beauty and perfection. There is probably no greater thrill than that which comes to a collector when he chances to break into a crystal lined opening in a vein or a rock.

"The big pay-off in collecting lies in finding a previously unknown mineral and having it named in the finder's honor. This is the collector's pot of gold. The writer is one of the fortunate few who has been so honored. In the past decade only 77 new minerals have been found throughout the world by the hundreds of thousands of collectors and mineralogists; probably less than half of these have been found under circumstances that would permit them to be named in honor of the finder."

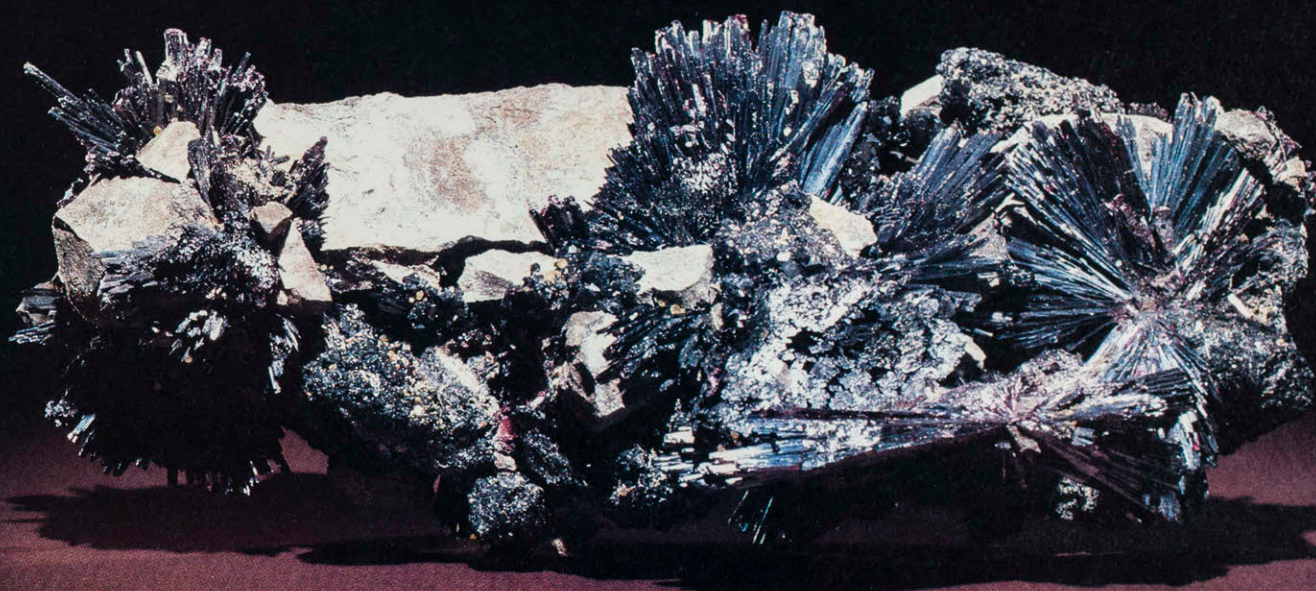
You can imagine, after reading the above, the extent of our disappointment in finding that bandylite, the hydrous copper borate from Mina Quetena, near Calama, Chile, was unstable in our country. I remember Mark's description of it, "May be spangalite," before it was described.

When you're looking at the collection, you will see my favorites, the paravauxite, the flower-like specimen, vauxites and metavauxites (the whole damn family as one viewer so descriptively put it), kermesite, many pyrites, those from Ubina with the sphalerite crystals on them, and the one from Chocaya which has a chatoyant, or sort of cat's eye, quality. It resided on our fireplace in Chocaya. It's difficult to list them, but I would be unfair to Rhodesia, with mineral wealth beyond compare, if I failed to point out the beryls, asbestos, copper, gold, and the aforementioned kermesite, one of the best specimens in the collection.

Besides the minerals on display, there are many boxes of minerals the Museum will use as a "Study Collection." In this way I hope their use will serve as a continuation of Mark's work and will help to promote the continued study of minerals.

The collection gave Mark, his friends, and me great pleasure and I'm sure he would join me in the hope that it will continue to give pleasure to all who see it.

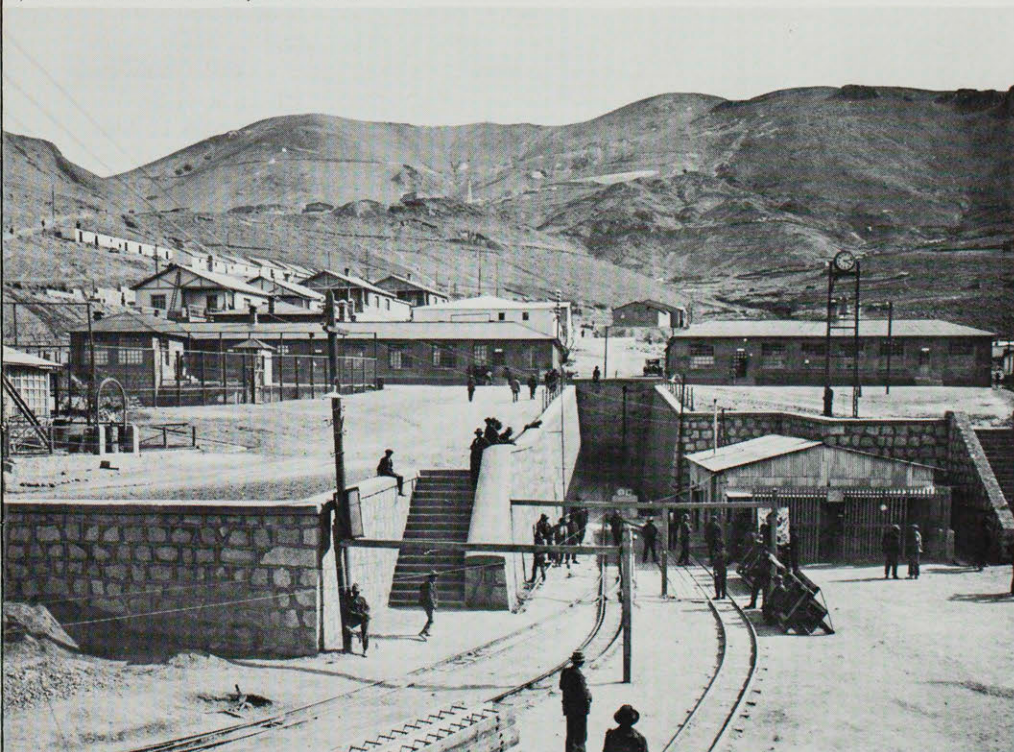
Jean Bandy, whose hobby became mineral collecting after her marriage to Mark Chance Bandy, has written this article for TERRA to coincide with the opening of the Stuart Hall of Gems and Minerals in which the Bandy Collection is featured.



This kermesite specimen, measuring about 18 cm. across, is one of the world's finest. It was presented to Mark Bandy in the early 1950's when he visited the Globe and Phoenix Mine, Que Que, Rhodesia.

15

The portal of Siglo XX Tunnel, Llallagua, Bolivia. The building corner in the far left center was the Bandy residence.



Bandy "geologizing" in Morocco.



A PORTFOLIO OF BRAZILIAN GEM CRYSTALS

16

Of the more than 2500 mineral species known today, a few possess the beauty, rarity, and durability that place them in the category of a gemstone. These minerals may be well known only in their finished forms as beautifully cut gems. The history of that beautiful gem in the jeweler's window is a fascinating story, a story which is told in the "Minerals to Gems in the Americas" exhibit of the new E. Hadley Stuart, Jr. Hall of Gems and Minerals. This exhibit, conceived by Alex Deutsch, will teach the public the story of gems before they've met their appointment with the gemcutter. Questions which will be answered include: How do the various gem species form? How do they occur? How are they mined? Who mines them? How are they processed after they're mined? And finally, how are they used? These questions will be addressed in the Stuart Hall by a series of documentary slide presentations filmed in gem-producing areas all over North and South America. These documentaries supplement the best gem material currently available, displayed in six adjoining cases.

Presented here, in a small but beautiful collection of photographs, are rough crystals of four of the gem species highlighted in the exhibit. The crystals included were selected because they are particularly fine examples of the respective species "in the rough."

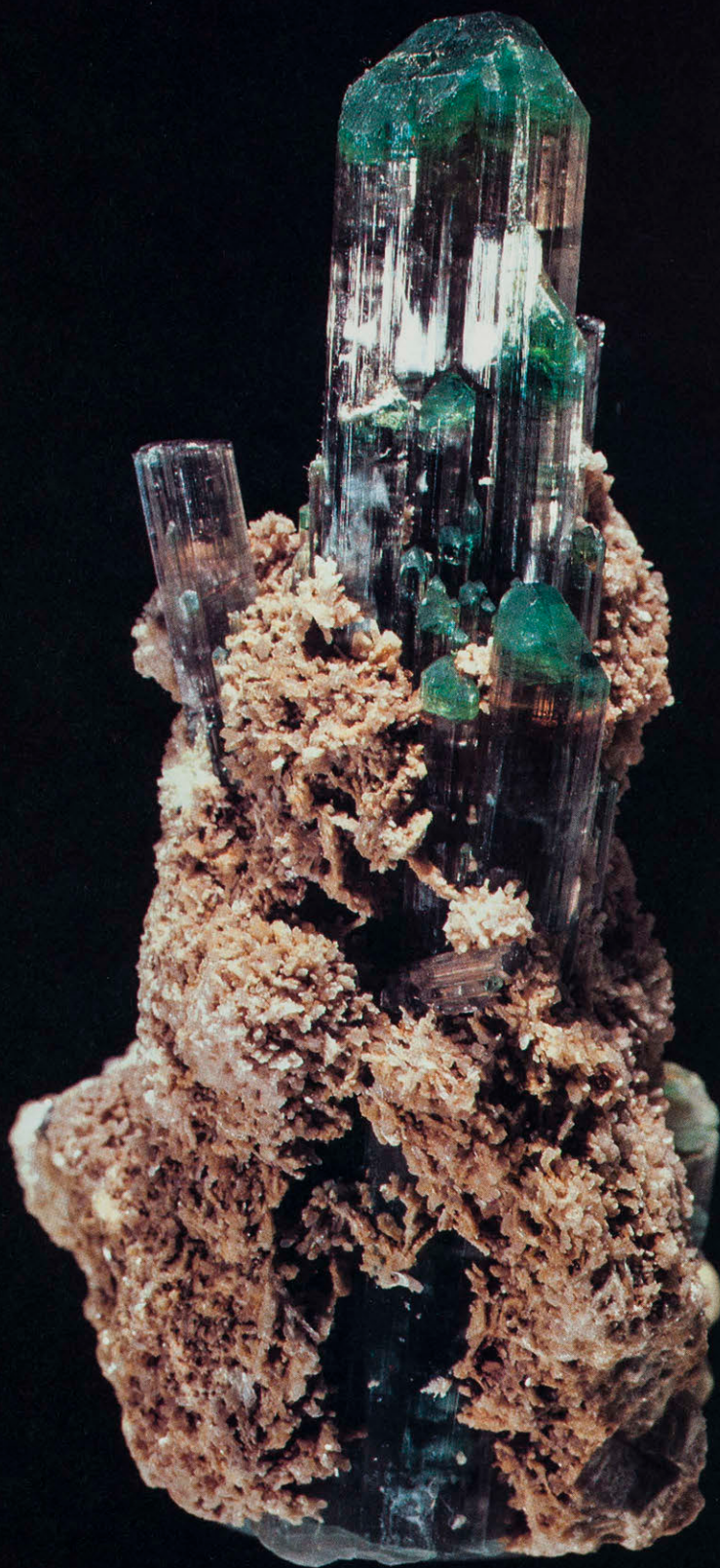
Photos by Larry Reynolds

A particularly fine gem-quality aquamarine crystal from Teofilo Ontoni, Minas Gerais, Brazil. Aquamarine is the blue-green gem variety of the mineral beryl. A multifaceted natural termination caps this exceptional 14 cm. long crystal.





Kunzite, named for the American gemologist George F. Kunz, is the lilac-pink gem variety of the mineral spodumene. The pegmatites of Southern California produced the first kunzite and subsequently, many magnificent crystals. The very fine 21 cm. crystal, however, is from near Urupuca Itambucari, Minas Gerais, Brazil.



The Golconda Mine, Minas Gerais, Brazil, has produced many fine bicolored tourmalines. This approximately 14 cm. high specimen has the characteristic coating of cookeite.



The finest topaz is the deep golden "Imperial Topaz." This magnificent 27 cm. long crystal from Ouro Preto, Minas Gerais, Brazil, is believed to be one of the largest such crystals in the world.

The Hixon Gem Collection

Colonel Frederick C. Hixon of San Antonio, Texas has just completed the gift of his magnificent gem collection to the Natural History Museum of Los Angeles County. This collection of more than two hundred faceted and polished stones is valued at in excess of a million dollars. It was assembled during a period of years with a single goal in mind: to exemplify as complete as possible a color spectrum for each of the colored stone species. Each gem in the collection had to be of the finest quality available and be of a size practical for use in jewelry.

Colonel Hixon has been an avid collector for most of his life. An ardent and noted sportsman, he directs the affairs of a widely diversified investment company from his San Antonio, Texas office. His expertise and success are well known in the business community. Hixon's interest in the rare and unusual has resulted in significant collections of coins, stamps, art, guns, and knives, as well as gems. His philanthropies have included major gifts to numerous medical, educational, and historical organizations. Hixon's contributions to the San Antonio Zoological Society and to the preservation of wildlife have been recognized nationally.

Colonel Hixon conceived of the idea of a gem collection in February of 1970. He built a gem laboratory in his home and took a "home study" gemology course with the assistance of Richard Liddicoat, Jr., Glen Nord, and Ken Moore from the Gemological Institute of America. By April, 1970, gems were being selected for the collection. Thousands of gems were submitted from gem dealers around the world. Each gem was carefully examined by at least two gem laboratories. If a gem was found to be suitable for the collection, it was acquired, labeled, and catalogued according to its variety, species, color, origin, cut, and weight.

The first stone Hixon chose for the collection was the Padparadscha sapphire. The name means lotus blossom, an allusion to its delicate pinkish-orange color. It is now considered to be one of the finest stones in the collection. The Padparadscha quickly was followed by fifteen more sapphires which combined to form one of the finest sapphire collections ever placed on public display. Following the completion of the sapphire

by Ben R. Hammond, Jr.



Photos by Larry Reynolds

suite, the other gem groups were similarly collected. The tourmalines collected were not only of all available colors, but were from all the most important source areas. The tourmalines were soon followed by spinels (often mistaken for rubies, even in the crown jewels of England), zircons, topaz, garnets, opals, ...until the collection was completed.

Perhaps the most interesting group of gems in the collection are the "collector's stones." These are gems that, either due to extreme rarity or because they are beautiful but not durable enough to use in jewelry, are known only to the gem collector. An example of a collector's stone is sphalerite. Sphalerite is a brilliant faceted stone that occurs in many colors, but it cleaves (breaks easily along potential

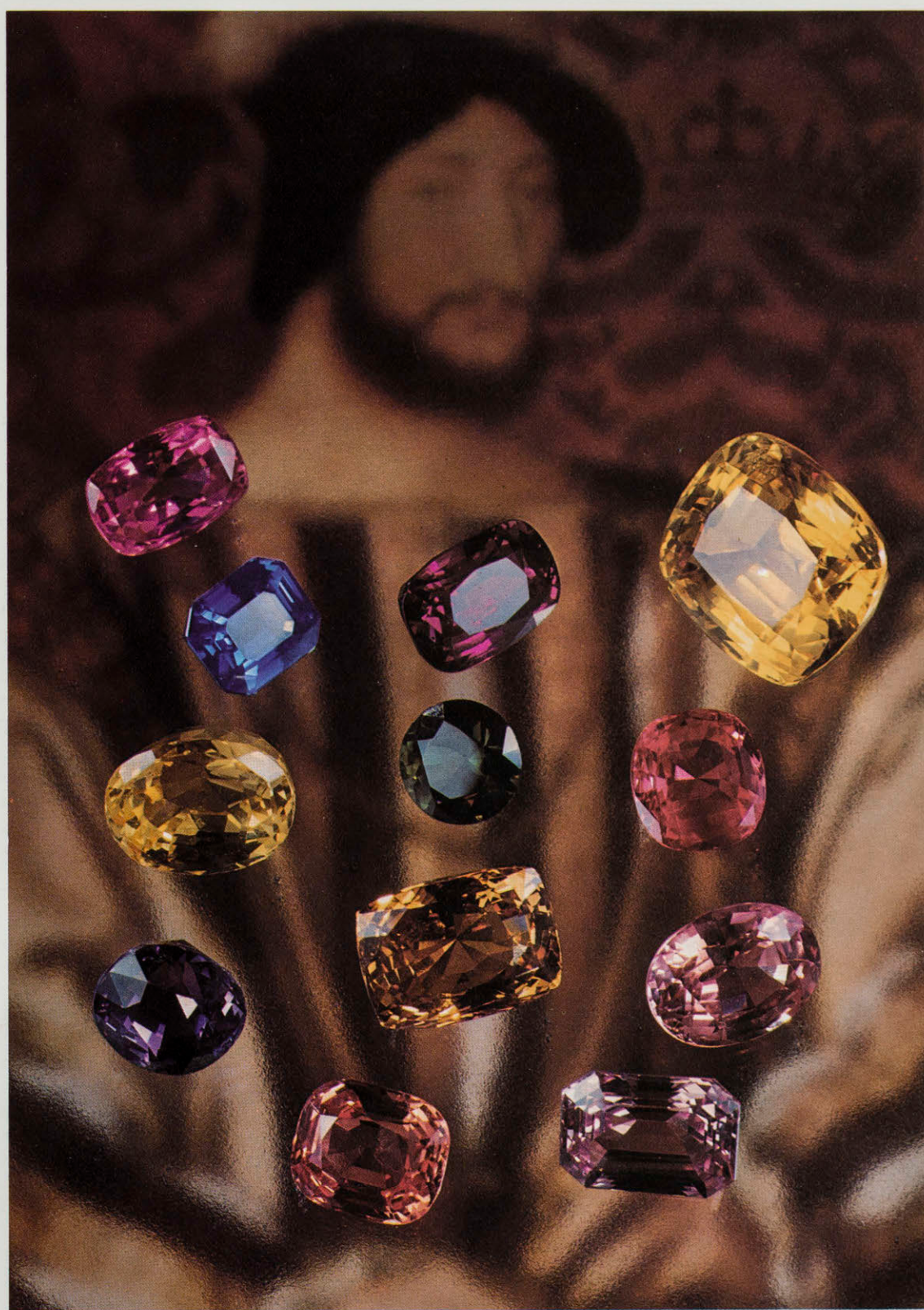
crystal faces) readily and is therefore not practical for jewelry. Other well-represented examples include a magnificent 43.09 carat green sphene, a 14.22 carat rhodochrosite, and a 37.46 carat green fluorite.

Through Allen Caplan of New York, a highly respected collector of gems and minerals for museums, Colonel Hixon met Dr. Giles Mead, Natural History Museum director, and Douglas MacDonald, a Museum trustee. Mead and MacDonald first went to San Antonio in April, 1971, to meet Hixon. Colonel Hixon, a native of Los Angeles, was pleased with their plans for a major new gem and mineral facility, and in 1973, donated the first portion of his gem collection to the Museum. Since 1973, periodically he has donated portions of his collection until the gift of gems was completed in the spring of 1977.

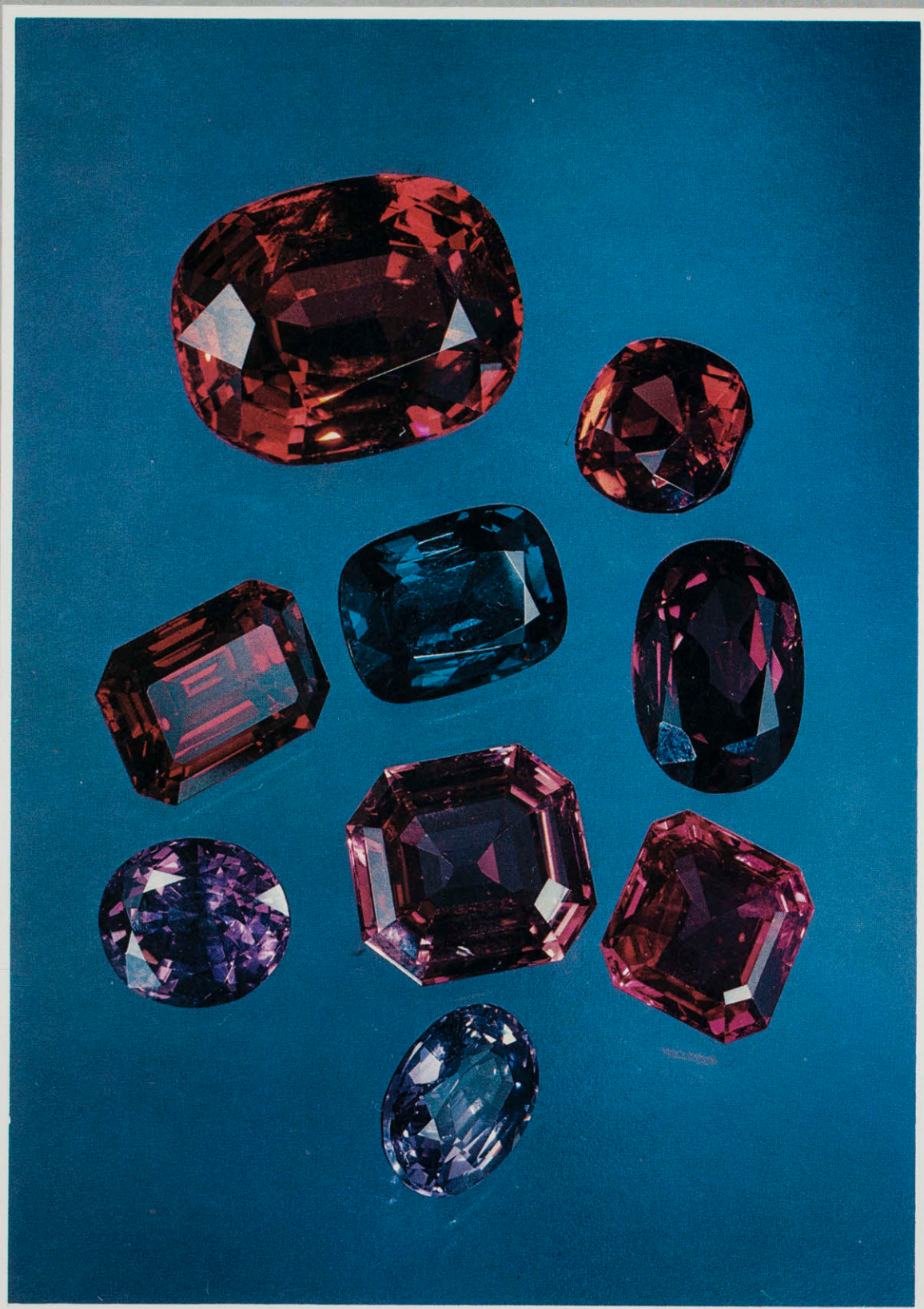
The collection as it is housed in the Museum will serve a dual purpose. First, visitors to the Museum will have an opportunity to learn and appreciate the great variety and magnificent beauty of gems. Common misconceptions, such as that sapphires are always blue and that topaz is always yellow, will be dispelled by the Hixon display. Such a display has long been needed on the west coast. The second, and perhaps more important function of the collection, is that it is designed to be a working collection, dedicated as a research vehicle for interested and qualified gemologists. Colonel Hixon specifically required that the Museum receiving his collection provide a laboratory equipped for gemology, and that this laboratory, as well as his collection, be made available to gemologists under the close supervision of the Gemological Institute of America for advanced classes in colored gem identification and evaluation. This laboratory is now complete and located in a secure, well-equipped mezzanine area above the gem vault. The use of the collection by the G.I.A. makes the collection unique among Museum collections and guarantees that the Museum itself will be a dynamic teaching institution in gemology.

Ben R. Hammond Jr. is a San Antonio, Texas, gemologist who was Col. Hixon's consultant in amassing the collection.

Photos by Erica and Harold Van Pelt



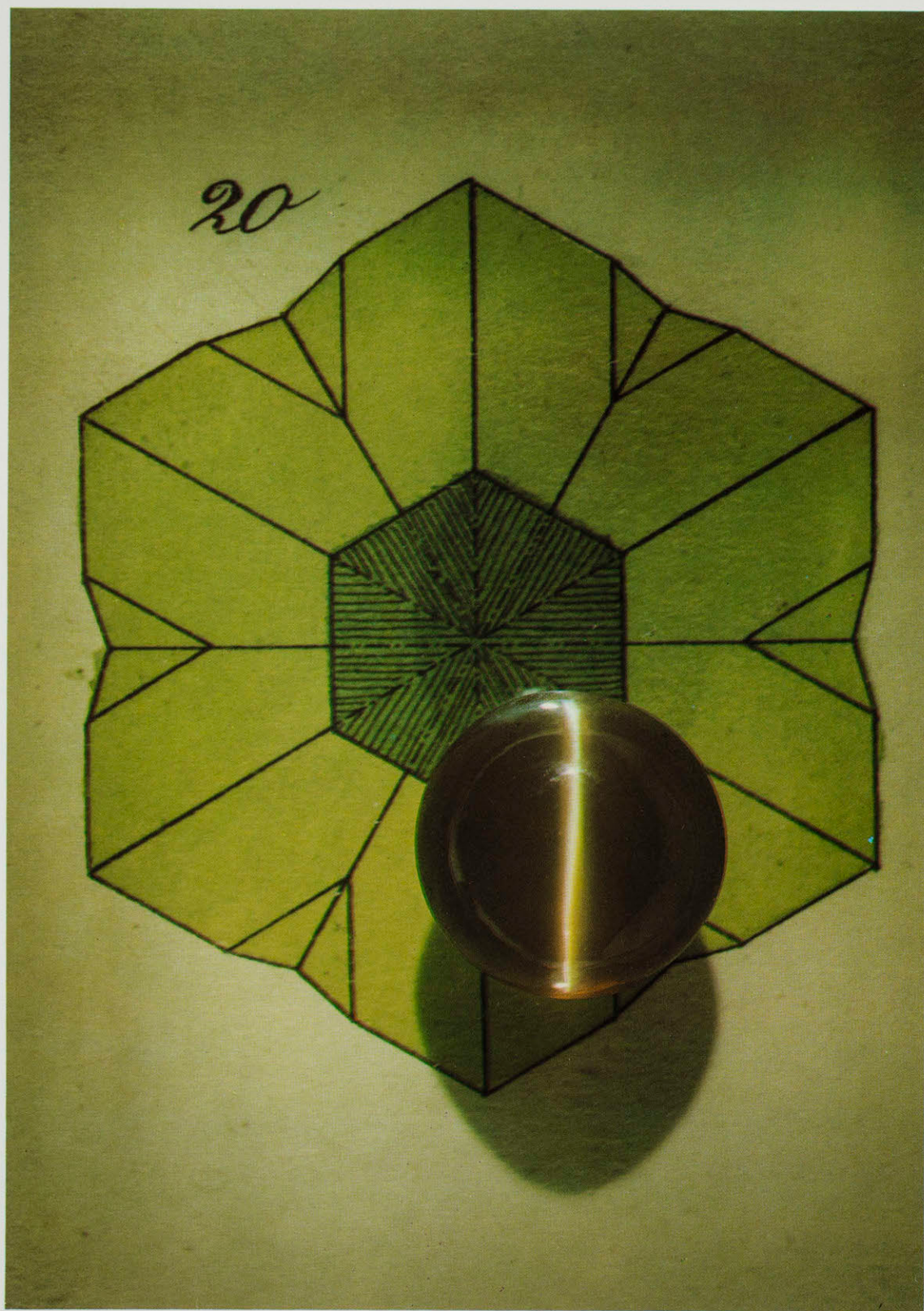
It is commonly believed that all sapphire is blue. This magnificent suite of twelve colored sapphires, ranging in size from a 4.36 ct. green to a 39.72 ct. golden sapphire, proves this belief to be false.



Spinel has physical properties closely resembling that of ruby. Thus, it is commonly used as a substitute for ruby and, in fact, many famous rubies, such as the Black Prince's Ruby and the Timur Ruby of the British Crown Jewels, are actually spinels. Particularly significant amongst this impressive suite of nine spinels is the 55.68 ct. cushion cut ruby-colored spinel from Ceylon.

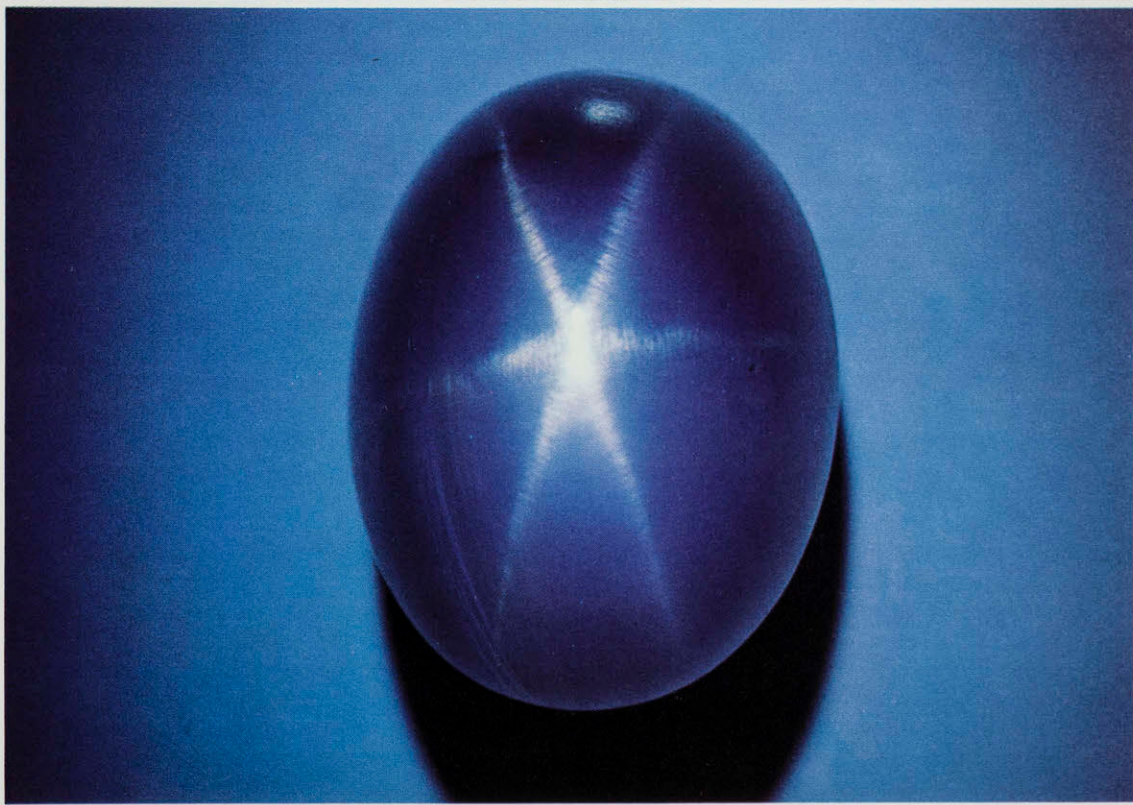
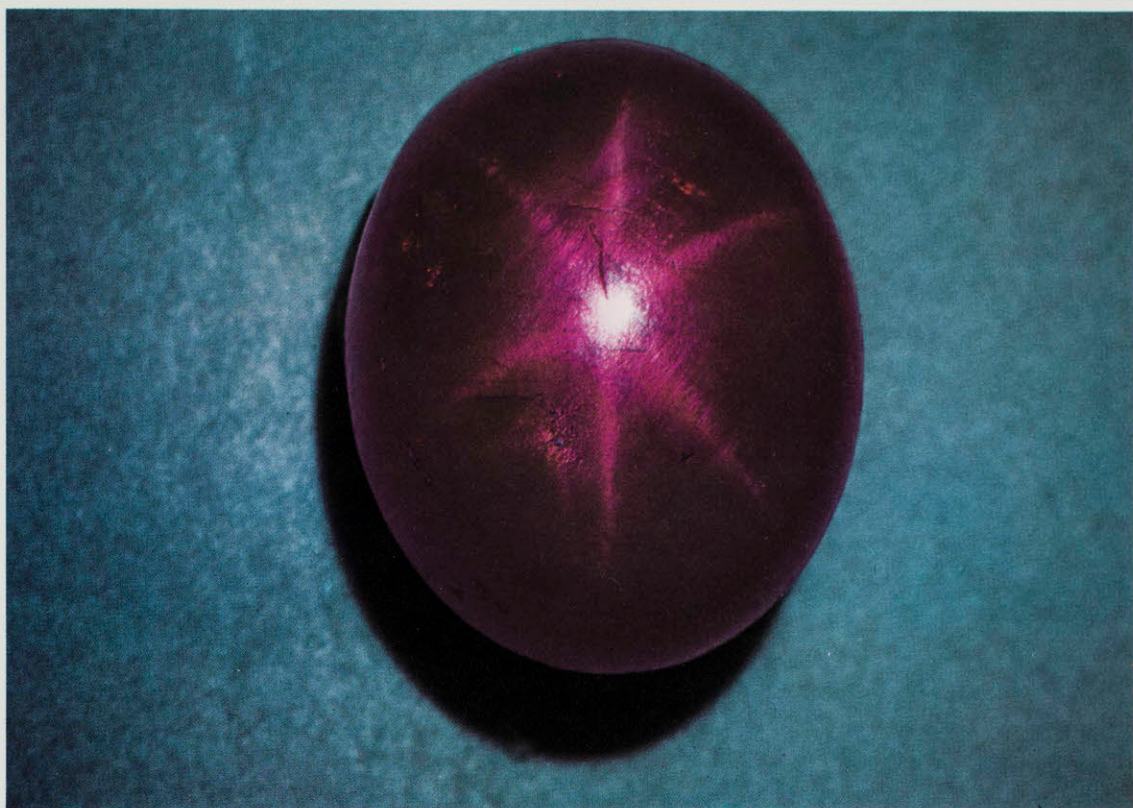


Tourmaline is the name of a group of mineral species. Only one of these, elbaite, is important as a gemstone. Elbaite has many varieties based on color, which include green elbaite, red to pink rubellite, and blue indicolite.



This honey-yellow 9.57 ct. chrysoberyl cat's-eye from Sri Lanka exhibits an optical property known as chatoyancy. Chatoyancy results from the parallel alignment of many inclusions in the stone and gives the stone an appearance similar to the pupil of a cat's eye.

Thousands of minute, needle-like inclusions of rutile, arranged in a definite pattern give this 18.29 ct. Burma ruby its "asterism" or star. Star rubies of this size and color are exceedingly rare.



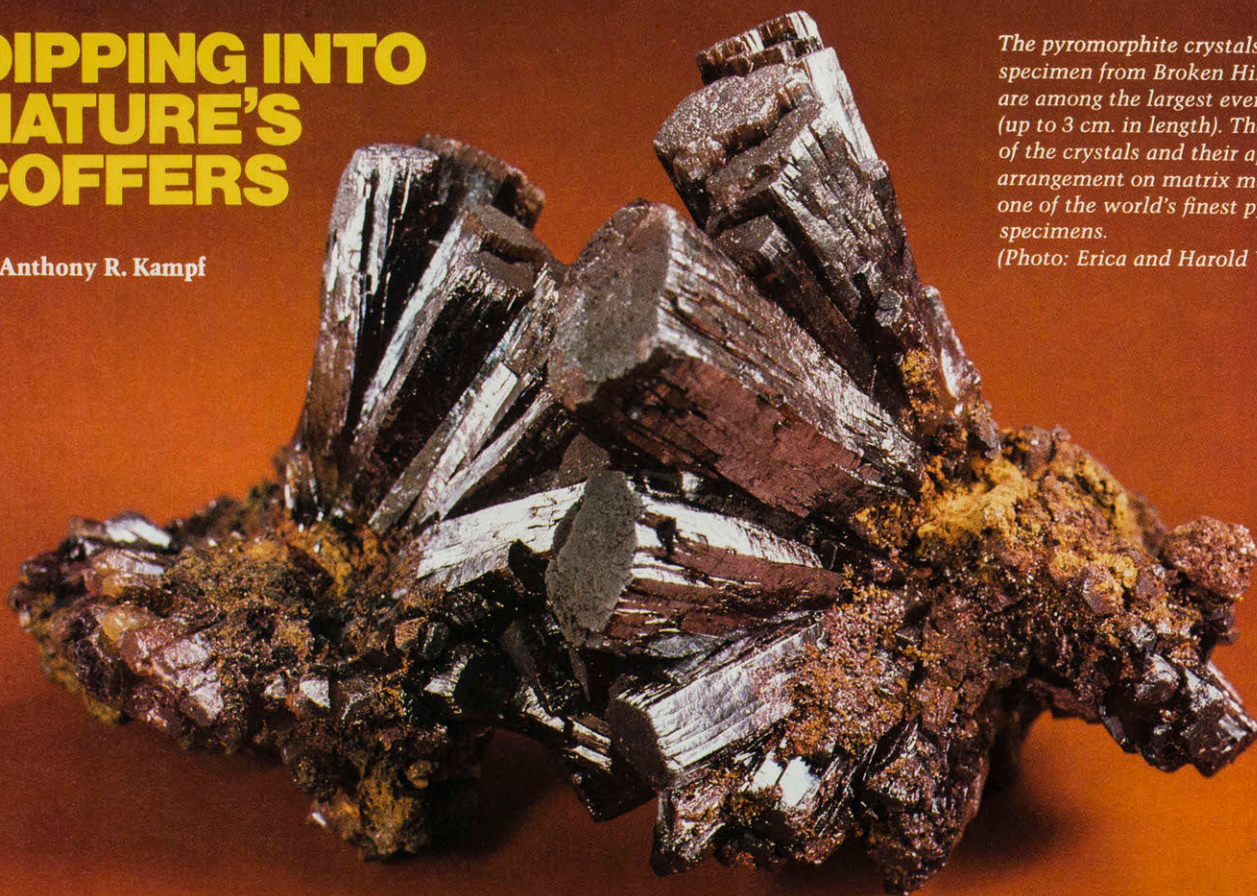
The same minute inclusions of rutile that give the ruby its star are also responsible for the star in this very fine 24.98 ct. star sapphire from Sri Lanka, formerly Ceylon.

DIPPING INTO NATURE'S COFFERS

by Anthony R. Kampf

The pyromorphite crystals on this specimen from Broken Hill, Zambia, are among the largest ever found (up to 3 cm. in length). The perfection of the crystals and their appealing arrangement on matrix makes this one of the world's finest pyromorphite specimens.

(Photo: Erica and Harold Van Pelt)



26

Minerals are the chemical compounds of which the earth is made. Since ancient times, they have been the raw materials from which man has fashioned his civilizations. They pervade nearly every aspect of our modern way of life, yet seldom does the average person see a mineral in its natural form.

Though they usually occur as small nondescript grains making up the rocks of the earth's crust, some of the more than 2,500 known mineral species have the potential of forming magnificent natural works of art, striking in form and color. We have striven to present many of these in the Stuart Hall of Gems and Minerals at the Natural History Museum of Los Angeles County. We have tried as well to present specimens whose beauty is less apparent, but none the less, remarkable, once one has been introduced to the more subtle facets of the mineral world.

As his gaze passes from specimen to specimen, the inexperienced viewer of a fine and varied mineral collection will probably pick out a few specimens which particularly strike his fancy. He is in the same position as the person similarly faced with a fine collection of art who asserts, "I don't know art, but I know what I like." Probably neither has chosen the best or the most valuable objects

since they lack the educated and discriminating eye of the connoisseur. Their inability to notice and appreciate the finer details has greatly diminished their potential for enjoyment.

A basic knowledge of mineralogy, the science of minerals, opens new vistas in mineral appreciation. The educational exhibits in the Stuart Hall of Gems and Minerals provide a graphic introduction to the principles of mineralogy. Glimpses at mineral formation, atomic structure, crystal growth, symmetry, pseudomorphism (the replacement of one mineral by another), and the various physical properties—color, luster, transparency, hardness—are all aimed at providing an insight into the fascinating world of minerals.

One need not be an expert mineralogist to distinguish the fine specimen from the mediocre. A few straightforward criteria provide the basics for arriving at this judgment. Perhaps first the fine specimen must show only a minimum of external damage such as bruises, scratches, cracks, and breaks. That damage suffered at the hands of man is generally least tolerable, but natural damage suffered before extraction from the earth can be equally detractive. Perfection of crystal form is high on the list; unusual developments are of added interest. It is particularly im-

portant that the terminal faces of a crystal, referred to as its termination, be well formed and free from damage.

Minerals which are normally colored are most prized when their color is true and vivid. High luster, distinctive of some minerals, adds to their value when it is well exhibited. Surface coatings and etching, which obscure the mineral's luster and color, are decided drawbacks. Minerals which are commonly transparent are judged of highest quality when they are perfectly so and free of internal flaws. This is particularly true of minerals which may be cut and polished into gems. In many cases, these actually have greater value as gem faceting material than as mineral specimens.

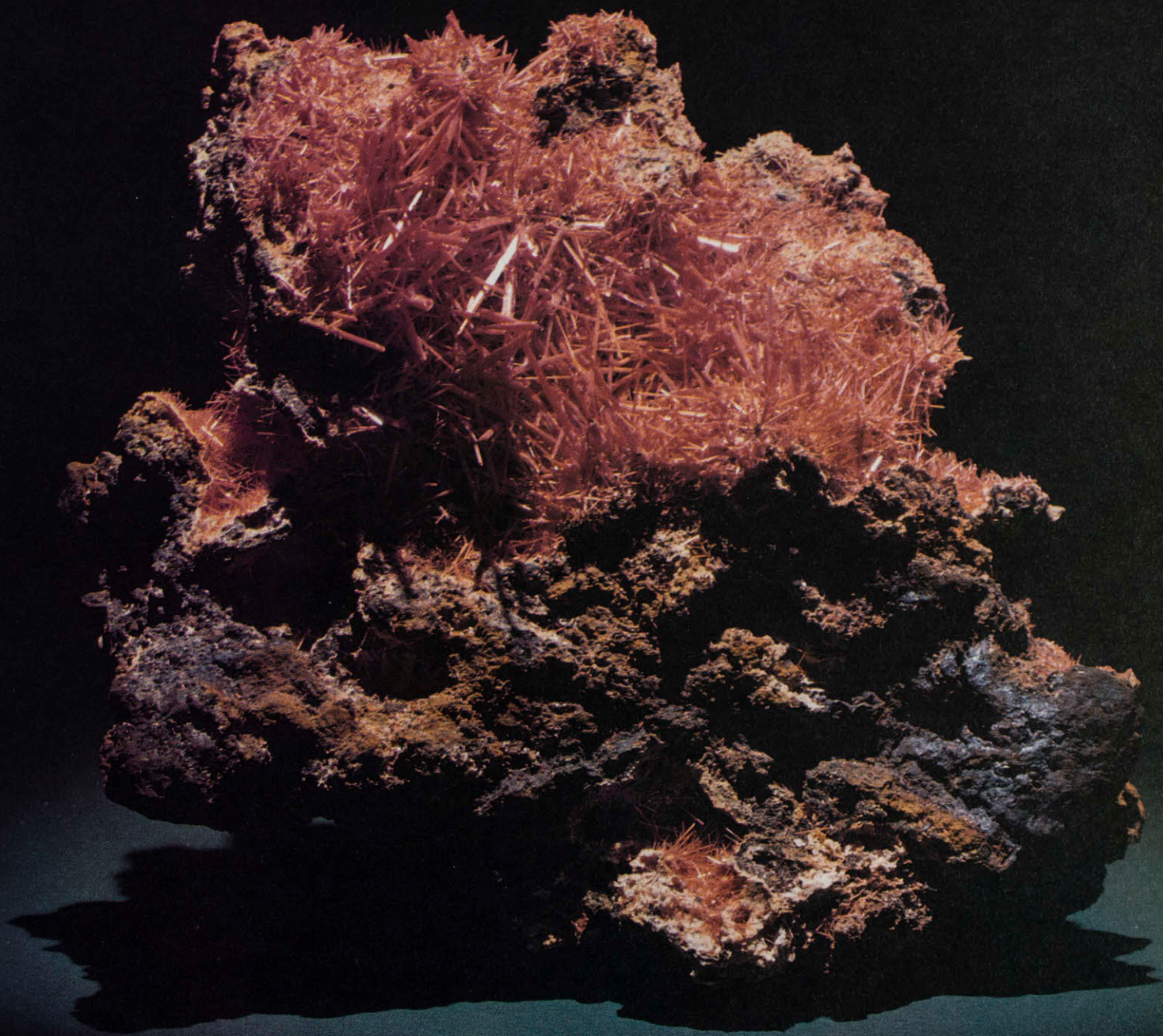
Size and rarity are also important factors. Naturally, larger crystals are more highly valued than smaller ones, provided their overall quality is comparable. Fine specimens of rare mineral species are always sought after as are well-crystallized specimens of more common species, which only rarely form in good crystals. Mineral specimens exhibiting rare color, twinning, pseudomorphism or the like also have added value.

Finally, the importance of the arrangement of crystals or "composition" must be stressed. This is the crowning touch in

The pegmatite deposits of San Diego County, California, are known for their fine elbaite (tourmaline) crystals; none has produced more than the Himalaya Mine in Mesa Grande. This is considered the finest-known large (approximately 18 x 13 cm.) matrix specimen from that mine. It owes its high rating to the vivid coloration, size and quality of its largest elbaite crystal and to the aesthetic arrangement of this and smaller elbaites on the matrix of well-formed quartz crystals. The specimen is displayed in the Minerals to Gems in the Americas exhibit. (Photo: Erica and Harold Van Pelt)







In a pedestal case just inside the front entrance to the hall is the elbaite (tourmaline) on quartz from the Cruziero Mine, Minas Gerais, Brazil. It is remarkable for the size and perfection of the large elbaite crystal but even more so for its strikingly aesthetic "composition." This is from the E. Hadley Stuart, Jr. Collection. (Photo: Erica and Harold Van Pelt)

Crocoite's vivid red-orange color and long slender crystals make it one of the most popular minerals among collectors. The mines near Dundas, Tasmania, Australia, have produced far and away the finest crocoite crystals. This specimen from the E. Hadley Stuart, Jr. Collection was removed from the most spectacular pocket ever found. Its crystals reach about 6 cm. in length. It can be seen in a parallelogram case. (Photo: Larry Reynolds)

the making of a mineral masterpiece. Composition is a very subjective quality; a few things to look for are: a good proportion of crystals to matrix (the matrix is the rock upon which the crystals grow), a good balance of color between crystals and matrix or between one mineral species and another, a center of interest such as one crystal of obvious importance, and a natural stacking of crystals giving a sculptural effect.

The connoisseur of minerals, just as the connoisseur of any type of art, has developed an acute sense of aesthetics, but the search for fine mineral specimens is more than a simple search for beauty. It is a search based on comparison. Only through a great deal of experience with mineral specimens is the connoisseur able to single out the best or to appraise the merits of a specimen set before him.

In view of the very subjective nature of such decisions, it is reassuring to find that different experts usually reach similar judgments. By expert consensus, in fact, certain localities have become known as producers of some of the finest specimens of particular mineral species. These commonly are referred to as classic localities and their specimens as mineral classics. Silver crystals and wires from Kongsberg, Norway forming beautiful natural sculptures, lustrous perfectly-formed epidote crystals from Knappenwand, Untersulzbachtal, Austria, huge shining crystals of stibnite from Shikoku Island, Japan so highly prized that they are now considered national treasures: these are but a few that have attained the status of classics.

A fine mineral specimen need not possess all of the aforementioned qualities. Often it is one particular quality which elevates the specimen above many otherwise quite similar to it. Pictured herein are a number of specimens on exhibit in the Stuart Hall of Gems and Minerals which are among the best of their kind in the world. It is hoped that these will serve to illustrate the working of the expert mind in judging fine mineral specimens.

Some of the other exceptional specimens which the visitor to the hall should take special note of are: (in parallelogram cases) two of the world's finest kermesite specimens, the largest known polybasite crystals, one of the finest wulfenite specimens from the famous Glove Mine in Arizona, and fine specimens of hopeite, orpiment, manganite, topaz, cuprite, galena, paravauxite, rhodochrosite, fluorapatite, and molybdenite; (in the Light Sensitive Minerals exhibit)



Cuprosklodowskite is one of a variety of very rare and vividly colored uranium minerals produced by the mines of Musonoi, Katanga, Zaire. Measuring about 15 cm. across and with crystal needles up to 2 cm. in length, this specimen is ranked among the world's best. It is exhibited in a parallelogram case. (Photo: Erica and Harold Van Pelt)

a large well-formed proustite specimen from Chanarcillo, Chile; (in the Minerals to Gems in the Americas exhibit) the world's largest imperial topaz crystal, two of the largest kunzite crystals, one of the largest heliodor crystals, a large Brazilian emerald specimen, and a fine elbaite on quartz from the Tourmaline Queen Mine; (in the Gem Vault) very fine uncut ruby and tanzanite crystals; (in the Bandy, the Collector exhibit) the finest known Bolivian cassiterite specimen; (in the Gold Rush exhibit) a large gold nugget from

Atlantic City, Wyoming, a fine crystallized gold from the Colorado Quartz Mine in California and the small but aesthetic crystallized gold "wreath" from the Mother Lode region of California. Several of these specimens are pictured elsewhere in this issue of TERRA.

Anthony Kampf is associate curator of Mineralogy/Geology at the Natural History Museum of Los Angeles County. His specialization is descriptive mineralogy and crystallography.



The mine at Tsumeb, South West Africa has yielded more fine mineral specimens than any currently-producing locality. These include some of the most striking azurite specimens ever found. This azurite specimen from the E. Hadley Stuart, Jr. Collection is an aesthetic arrangement of lustrous, well-formed crystals up to 9 cm. in length on matrix. It is exhibited in one of the parallelogram cases. (Photo: Larry Reynolds)



The classic, now exhausted, locality of Knappenwand, Untersulzbachtal, Austria, has produced the world's finest epidote crystals. This specimen, exhibited in a parallelogram case, has bright, lustrous gemmy crystals typical of this locality. Its remarkable freedom from damage and even from obvious attachments and its aesthetic twisted stacking of crystals sets this specimen apart as one of the finest known. It is about 18 cm. high and is on long-term loan from Ed and Betty Harrison. (Photo: Erica and Harold Van Pelt)



*Among knowledgeable collectors
Kongsberg, Norway, elicits visions of
the beautiful natural sculptures of
silver crystals and wires which were
once found at that classic locality.
This 15 cm. high twisted wire is one of
the most aesthetic ever found. It can
be viewed in one of the parallelogram
cases. (Photo: Erica and Harold
Van Pelt)*

GOLD RUSH

by Larry E. Burgess

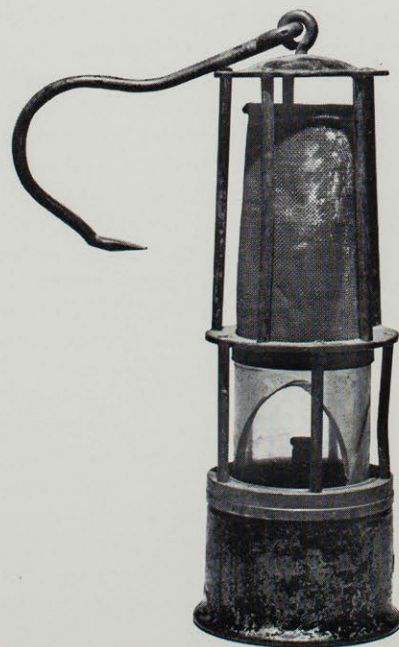
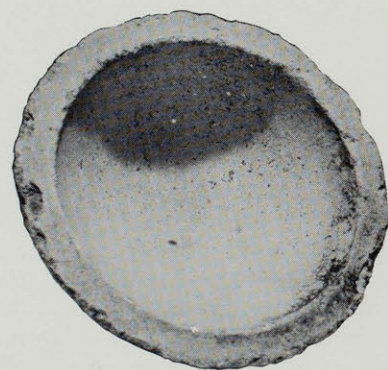
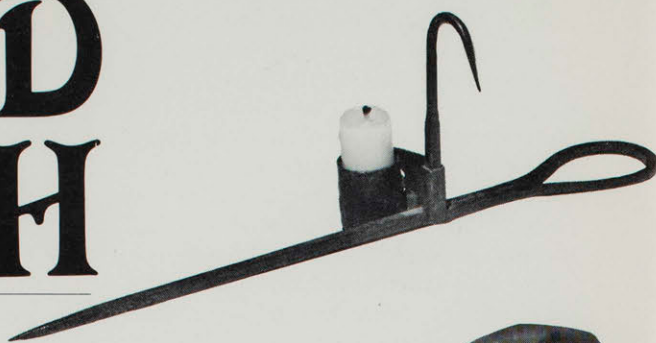
"Gold Rush" is the evocative title of the exhibit in the E. Hadley Stuart Hall of Gems and Minerals which is devoted to the display of artifacts related to California's gold mining history and to the gold itself, in all its beautiful natural forms.

The exhibit well illustrates why men came to California by the thousands, lured by that irresistible mineral, gold, which down through the centuries people have prized, and for which they have sacrificed and even killed.

For centuries the streams of the Sierras and the shiny particles in them were known to the Indians who fished in them and hunted on their banks. Later, when the Spaniards and Mexicans came, they showed little interest in California's mineral potential. During the early nineteenth century, some American hunters and trappers plied their trade in Mexican California along the Sierra streams and they, too, observed gold. On March 9, 1842 Don Francisco Lopez found gold in Placerita Canyon in the San Gabriel Mountains.

However, that discovery did not cause the excitement generated by the event of Monday, January 24, 1848. James William Marshall, with whom John Sutter contracted, was inspecting the watercourse for their sawmill near the south fork of the American River when he picked up a rock and "discovered" gold. That event affected the destiny of California and of the nation itself.

It took until March for a small article about the discovery to appear in the newspaper *Californian*. Its simple headline ran "Gold mine found." Several months passed before the hysteria began. When word of gold spread across the land, thousands of men and far less numbers of women set out for California. Taking ships from New York around the Horn or cutting across the Isthmus of Panama by mule-back, or most rugged of all, pushing by wagon overland across the continent, they came in quest of abundant wealth.



Photos by Larry Reynolds

Soon streams like the Feather, Tuolumne, Merced, and Stanislaus became sites of rudely constructed tent towns filled with hopeful men and the promise of overnight riches. The gold that the "forty-niners" were seeking came in the form of dust, flakes, grains, and nuggets. Their quest has been compared to that of Jason of Greek mythology, who sailed on the Argo in search of the Golden Fleece. Those who sailed with him were dubbed Argonauts, as were the gold searchers in California.

Illusions of rapid wealth quickly gave way to the harsh realities of hardship, physical misery, and even danger. Yet gold fever impelled these latter-day Argonauts to push on. Only four years after Marshall's discovery, during 1852, the peak year of the gold rush was reached. Eighty-one million dollars worth of gold was harvested from the earth, and nearly a hundred thousand miners traversed central valleys of the state and western slopes of the Sierra Nevada Mountains.

Most "forty-niners" came from the East and were primarily men in their twenties and thirties. Eventually, four-hundred thousand emigrants came to California. The majority of them did not prosper greatly nor did they starve. Thousands gave up and returned home. Nevertheless, to those adventurers the gold rush was a great experience. Hundreds kept journals or diaries, many of which make lively reading.

We know from some of these that the overland route was rugged and took about six months, depending on which way, northern, central, or southern, a person took. For those who made it, the trek offered incredible scenery and adventures. In one account, the Argonauts pushed forward and then "passing over long, weary stretches of pathless plains, under beetling crags, along frowning chasms and over alkaline deserts, where barest sustenance of life was denied them...enduring sickness and privations sufficient to have discouraged a less determined body, comrade after comrade falling from the ranks, the ever-decreasing band still resolutely marched onward into the Land of Gold, to become the creators of a mighty commonwealth, the builders of states."

Rodman Paul, in *California Gold*, states that the tedious route by ship around the Horn could take between four and eight months in 1849. The Panama Isthmus route was much shorter—hence its popularity in the early days. The difficult conditions over the Isthmus were made more so by mule-back and canoe



One of the most unusual gold specimens in the collection is this 5 cm. high natural gold "ramshorn" from Colorado. The specimen is believed to have been found about 1878 and is reputed to have belonged to Dr. David H. Dougan, then mayor of Leadville, Colorado.

transportation. People often paid as much as a thousand dollars for such a trip.

Once the prospectors arrived in the gold fields their hardships were not over. California had only been ceded to the United States by Mexico in 1848. Two years later, in 1850, came statehood, and in the midst of "gold fever," lawlessness was rampant. Might, not right, frequently dictated the solving of issues. Every single facet of organized society was affected by the free-wheeling atmosphere.

Desertion rates in the Army in 1848–49 were 716 men out of 1290. They were all lost "to the diggings." The Navy fared no better; Pacific Squadron Commander Jones lamented: "For the present, and I fear for years to come, it would be impossible for the United States to maintain any Navy establishment in California." Reportedly, by the mid-1850's nearly five hundred commercial ships lay rotting with their cargoes on board in San Francisco harbor because passengers



Exceptionally bright leaf gold specimen approximately 10 cm. high from one of the Northern mines of California's Sierra Nevada Province. (Photo: Erica and Harold Van Pelt)

A very fine cluster of crystallized native gold octahedrons from California. This cluster, measuring about 3 cm. in diameter, was originally mounted as a stickpin and is from the Mildred Groesbeck collection. (Photo: Erica and Harold Van Pelt)



and crews had deserted them for the gold fields.

The backbreaking toil involved in mining for gold was considerable. Most of the prospectors who came as Argonauts were *not* miners. In the fields one might meet clerks, ministers, businessmen, lawyers, physicians, bartenders, policemen, and others testing their mettle against nature's finest granite and coldest water.

In the early days of the gold rush, placer mining, the oldest method of recovering gold-bearing sands and gravel in moving streams, was employed. Prospectors relied at first on the versatile washpan. With this they swirled a panfull of sediment and water, quickly learning that gold was the heaviest of all the materials in the pan and stayed inside when swirled. They also learned that gold had a reddish tone, and to differentiate between it and iron pyrite, which was harder and broke when hit instead of flattening.

They developed ingenious improvements on the pan, a box on rockers called a cradle, which had bars called riffles nailed to the lower end of it, and the long tom, which utilized an inclined twelve-foot trough ending in a riffle box. Later came the sluice, which was really an elongated long tom, combining several riffle boxes joined together. Water flowed through the sluice continually while the miners shoveled dirt into it along the sides. With the sluice they had come a long way from the pan in speeding up the process of sorting the gold-bearing dirt. Later, powerful streams of water, supplied by hydraulic monitors capable of killing a man in their intensity, were aimed at the mountain sites in order to wash down the earth containing gold. This practice was later outlawed because of the vast amount of destruction it reaped upon the environment and the sediment it produced which unwillingly abetted spring flood conditions.

The river mining described above went through an initial boom in 1849–50. Quartz mining began in 1849 and became an important part of the gold rush by 1851–52. Deep tunnel mining began in 1850 and by 1854 was one of the most productive methods of mining.

The prices for food and everything else in the camps and shantytowns were so high that people generally agreed that a half-ounce to an ounce of gold a day (gold was worth sixteen dollars an ounce) had to be found to keep a miner working in the same place. That was the amount that could keep him in food and supplies while putting a very little away. The work

was grueling drudgery but the adrenalin was kept pumping by news of rich strikes and abundant wild rumors.

The names the miners gave their camps were exotic combinations, ranging from Biblical inspiration to events that had occurred on the spot. The very titles enliven our memories of a colorful time now passed—Ophir, Angel's Camp, Drunkers Bar, Dead Man's Bar, Rough and Ready, Mad Mule Gulch, and Gouged Eye. These camps were primarily shantytowns with rude tent and wood contrivances. Towns sprang up in places with big strikes. With them came saloons, blacksmith shops, churches. When the gold was gone the towns were deserted. It was all wild and transient, tough and nostalgic.

The men were bound together as much by homesickness as anything else. Mail day was one of the big days in the camps, with everyone gathering hoping to hear his name called. Perhaps that is why daguerrotypes were so popular among the miners, for a likeness could be sent home to loved ones back East.

Justice in the mining camps was as simple as the life style. Its forms were swift, uncomplicated, and sure. Frequently, offenders would receive lashes. Lynching was practiced. Edward Buffum recalls seeing a lynching of five men allegedly arrested for a robbery and a murder. A crowd of two hundred miners formed a jury, determined them guilty, and sentenced them to hang. The entire deliberations took a half-hour.

The gold rush and the men who made it leave a mixed legacy for Californians. Fortunately, the enduring qualities have outlasted the more reckless and destructive tendencies. Ethnic prejudice, which for decades plagued Californians, enjoyed a heyday during the gold rush. A deep-seated anti-foreign feeling was strong among the majority of miners. The British were tolerated, but everyone else was put on a descending scale of acceptability. The Indians, who were not foreign at all, were shot at and loathed when not being used as laborers. The greatest contempt, however, was reserved for the Chinese. It has been said that less than ten Chinese lived in California in 1848. A decade later, having been imported for various kinds of labor, some twenty thousand Chinese were scattered through the gold country. Miners were suspicious of the Chinese, not only because they dressed differently and preferred opium to alcohol, but also because of their propensity for frugality, industry,



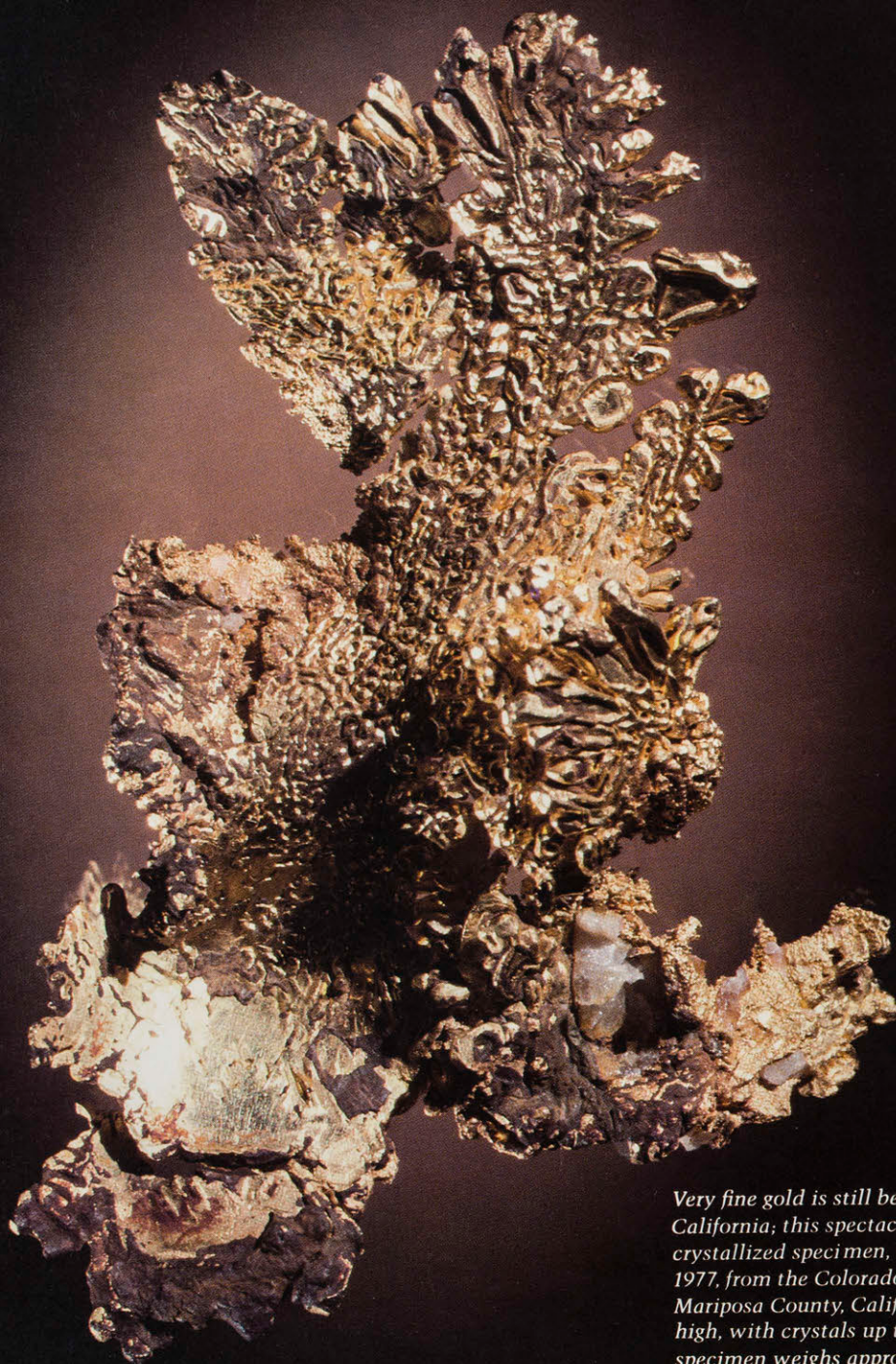
Exceptionally bright specimen of flattened native gold crystals from the Red Ledge Mine, Nevada County, California. This cluster of crystallized gold is approximately 4 cm. high.



This native gold nugget with traces of quartz matrix, was found in the 1930 Gold Strike, Atlantic City, Wyoming. The nugget weighs 34 troy ounces and measures about 6 by 9 cm. Nuggets of this size are exceedingly scarce. It was recently donated to the Museum in memory of Elsie G. Mead.

A nugget of crystallized native gold from Trinity County, California. The specimen is about 4 cm. long and weighs 5 dwt.





Very fine gold is still being found in California; this spectacularly well-crystallized specimen, taken in October 1977, from the Colorado Quartz mine, Mariposa County, California, is 10 cm. high, with crystals up to 6 mm. The specimen weighs approximately 112 grams.

independence, and close family ties.

If the miners showed little concern for ethnic minorities, they showed even less for the environment. Forests were hacked down and rivers polluted; erosion was fostered by crude mining techniques. It would take a great many years for the flora and fauna to recover in some areas.

A remarkable legacy of independence, physical endurance, and sheer triumph of will was passed down to later generations as the Argonauts helped to create a new society in the state. In 1849, San Francisco was little more than a village where cows grazed alongside nearby planted fields. By 1855, it bustled with fifty-five thousand people, all of whom, in one way or

another, were making their way as a result of the gold rush.

Many of the men who came to mine took other occupations and provided needed services. Many acquired great wealth. J. B. D. Stillman, an Argonaut and author of *Seeking the Golden Fleece*, began the first hospital in Sacramento. Philip Armour turned from mining to meat packing here and then in Chicago. John Studebaker, like Armour, turned his Placerville experience into a wagon-building enterprise. Leland Stanford, Charles Crocker, Collis P. Huntington, and Mark Hopkins found their way out of the diggings by means of dry goods and hardware. Ultimately, they helped build

the trans-continental railroad. Mark Twain and Bret Harte saw the gold rush excitement firsthand and immortalized it in their writings.

The Natural History Museum's Gold Rush display is dedicated to one of those great influences of the period, George Hearst, who after making his first fortune as part owner of the Ophir mine, parlayed his success into various brilliant careers as mining promoter, publisher, and United States Senator from California.

Dr. Larry E. Burgess is Archivist and Head of Special Collections at the A. K. Smiley Public Library, Redlands, California.

ETHNIC ARTS SHOP

MINERALS! The Ethnic Arts Shop now has an astounding array of minerals for sale in all shapes and sizes. This large collection includes crystal-lined geodes from central Mexico, enhydros (water-filled agates from Brazil in excess of 40-million-years old), volcanic agates from Black Rock Desert, Nevada, pyrites, quartz crystals, and petrified wood. Also available are mineral bookends, mineral spheres on lucite stands, and an extensive collection of mineral jewelry.



Amethyst crystal from Brazil. 10" high
\$100.00



A pair of septarian nodule bookends. 6" high \$54.00/set



Selenite crystal from Sonora, Mexico. 14" high \$275.00

A fine selection of mineral specimens and mineral jewelry is also available at the PAGE MUSEUM SHOP.

IN THE BOOK SHOP



COLOR ENCYCLOPEDIA OF GEMSTONES

Joel E. Arem, Ph.D., F.G.A.



This comprehensive survey is unsurpassed in answering the reference needs of both professionals and amateurs. Virtually every known gemstone is represented with stunning color photographs and definitive data.

Color

\$35.00

LOS ANGELES COUNTY NATURAL HISTORY MUSEUM

DR. GILES W. MEAD
Director
LEON G. ARNOLD
assistant Director
DR. THEODORE DOWNS
Chief Curator, Earth Sciences

DR. FRED S. TRUXAL
Chief Curator, Life Sciences
DR. HARRY KELSEY
Chief Curator, History
RICHARD LIPSCOMB
Chief of Education

NATURAL HISTORY MUSEUM OF LOS ANGELES COUNTY BOARD OF GOVERNORS

FRANKLIN OTIS BOOTH, JR.
RICHARD CALL, M.D.
Secretary
MRS. JUSTIN DART
Vice-President
C. V. DUFF
Emeritus
ALFRED M. ESBERG
ALBERT B. GLICKMAN
ED N. HARRISON
President

NORMAN O. HOUSTON
DOUGLAS J. MACDONALD
CHARLES O. MATCHAM
RICHARD C. SEAVER
MYNATT SMITH
MRS. E. HADLEY STUART, JR.
NANCY PETERSON WALTER
JOHN G. WIGMORE
DR. M. NORVEL YOUNG

NATURAL HISTORY MUSEUM OF LOS ANGELES COUNTY FOUNDATION BOARD OF TRUSTEES

B. E. BENSINGER III
FRANKLIN OTIS BOOTH, JR.
Chairman
JUDGE WM. MATTHEW BYRNE, JR.
GEORGE V. CALDWELL
RICHARD CALL, M.D.
RICHARD P. CARLSBERG
JOHN BROWN COOK
MRS. ARTHUR LEE CROWE, JR.
MRS. JUSTIN DART
Vice-President & Asst. Secy.
WILLIAM W. DREWRY, JR.
President
C. V. DUFF
ALRED M. ESBERG
ED N. HARRISON
Assistant Treasurer
LEWIS J. HASTINGS
DAVID W. HEARST
DANIEL R. HICKEN
NORMAN O. HOUSTON

MRS. EDWARD B. LILLY
DOUGLAS J. MACDONALD
EDWIN F. MAJOR
CHARLES O. MATCHAM
G. EVERETT MILLER
ROBERT P. MILLER
GEORGE C. PAGE
MRS. RICHARD W. SCHUUR
RICHARD C. SEAVER
Treasurer
MYNATT SMITH
RICHARD STEELE
MRS. JAMES STEWART
MRS. E. HADLEY STUART, JR.
Vice-President
MRS. FRANZ TALLEY
RICHARD S. VOLPERT
Vice-President
JOHN G. WIGMORE
DR. M. NORVEL YOUNG
Secretary

NATURAL HISTORY MUSEUM ALLIANCE BOARD OF DIRECTORS 1977-1978

EXECUTIVE COMMITTEE

JOHN G. WIGMORE
Chairman of the Board
ROBERT P. MILLER, JR.
1st Vice Chairman
MRS. DAVID DUQUE
2nd Vice Chairman
GORDON S. BODEK
3rd Vice Chairman
MRS. RICHARD SCHUUR
Secretary
LAWRENCE L. JEFFRIES
immediate Past Chairman
LEWIS J. HASTINGS
Member-at-Large
RANDALL J. MYERS
Member-at-Large

ELECTED BOARD

A. F. MICHAEL ATLEE
MRS. RICHARD BERGEN
WILEY BLAIR, 3RD
HENRY CLIFFORD
MRS. MICHAEL DART
MRS. ROBERT DAVIDSON
MRS. SUZANNE S. DRAGGE
THOMAS DUQUE
MRS. RICHARD GRIOT
CONRAD C. JAMISON
MRS. KENNETH LEVENTHAL
ERNEST M. LEVER
JOHN L. MEEK
MRS. JOSEPH MESSLER
MRS. JOHN P. NUGENT
PETER PARFITT
MRS. CARLTON H. PAUL
MRS. J. C. SCHWARZENBACH
MRS. JAMES STEWART
MRS. IRVING STONE
MRS. ROBERT TUTTLE
HARRY TYTLE

HONORARY MEMBERS

MRS. BRUCE BELT
MRS. M. L. BRITTAIN, III
JOHN F. CAMERON
MRS. ROBERT EDWARDS
MRS. ROBERT FEINERMAN
FRANK E. GRANT
MRS. ALLAN HERBERT
MRS. MORTIMER KLINE
MRS. MAX MINTZ
MRS. PAUL O. PLATT
MRS. THOMAS REDDIN
MELVIN SHAW
MRS. LEON SINGER

HONORARY LIFE MEMBERS

C. V. DUFF
DR. HERBERT FRIEDMANN
ED N. HARRISON
MRS. MAURICE MACHRIS
MISS RUTH I. MAHOOD
CHARLES O. MATCHAM

EX-OFFICIO BOARD MEMBERS

MRS. HENRY LOW
DR. GILES W. MEAD
MRS. EWING SELIGMAN

RESEARCH ADVISOR

HARRY PACK

ADMINISTRATIVE SECRETARY

MRS. FRANCES S. KELLOUGH

Museum Alliance Membership

There is something in it for everyone! You are invited to become a member of the Natural History Museum Alliance, to participate in its programs, to receive its publications and announcements.

Membership privileges and pleasures include:

1. Subscription to the Alliance TERRA
 2. The monthly CALENDAR OF EVENTS
 3. Family participation programs—NEW DIMENSIONS TO DELIGHT—tickets available only to members
 4. 10% discount on most items at the Museum Bookshop and Ethnic Arts Shop
 5. Invitations to previews and receptions for new exhibitions and to meet lecturers
 6. Program of benefit for children
 7. Group travel program
- Memberships are available in the following categories:
- | | |
|--------------|--------------------------|
| Active | 15.00 Annually |
| Contributing | 25.00 Annually |
| Supporting | 50.00 Annually |
| Sustaining | 100.00 Annually |
| Corporate | 100.00 to 1000.00 |
| Life | 1000.00 (single payment) |

Make checks payable to: MUSEUM ALLIANCE
900 Exposition Boulevard
Los Angeles, California 90007